

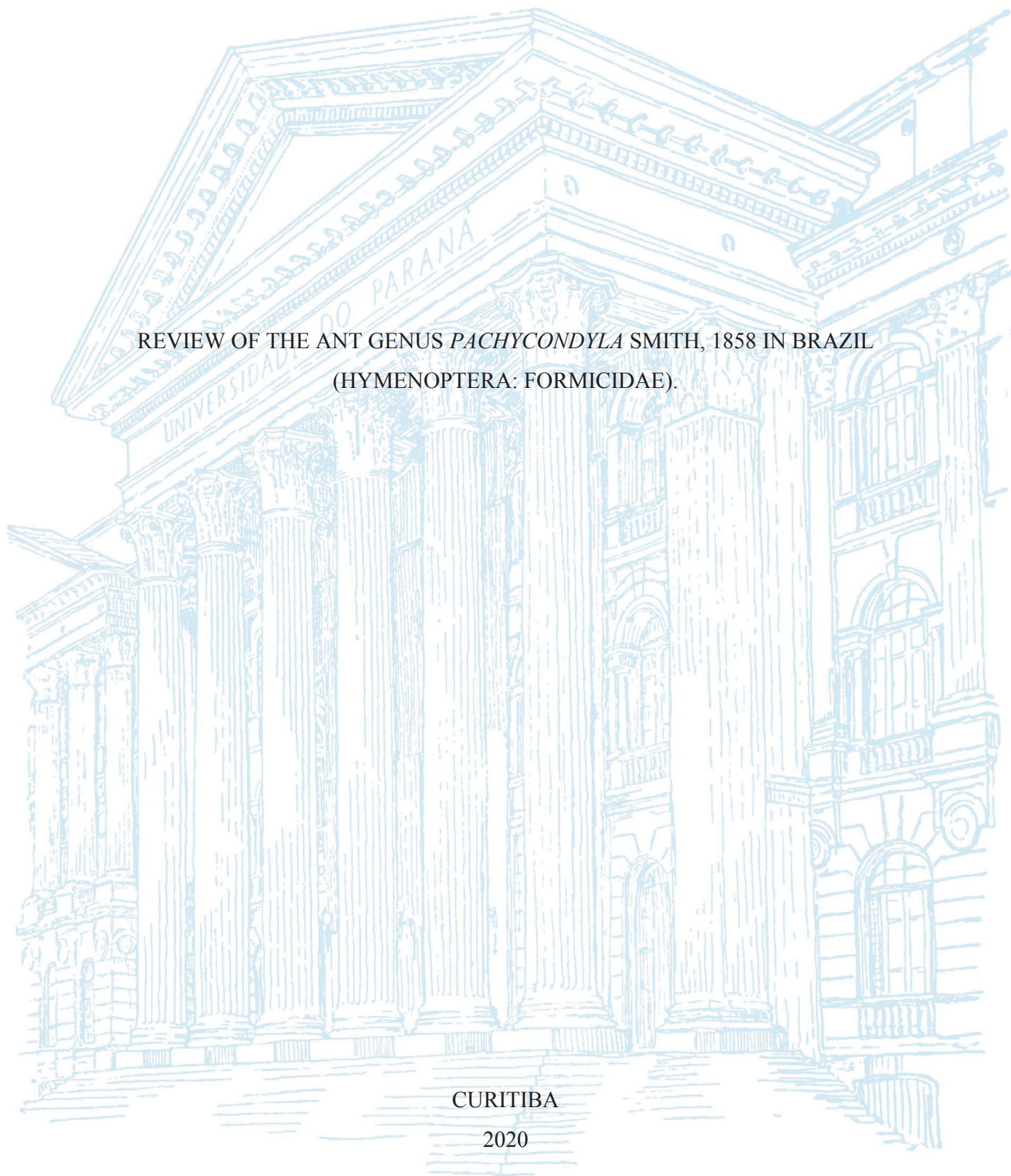
UNIVERSIDADE FEDERAL DO PARANÁ

FREDERICO ROTTGERS MARCINEIRO

REVIEW OF THE ANT GENUS *PACHYCONDYLA* SMITH, 1858 IN BRAZIL
(HYMENOPTERA: FORMICIDAE).

CURITIBA

2020



FREDERICO ROTTGERS MARCINEIRO

REVIEW OF THE ANT GENUS *PACHYCONDYLA* SMITH, 1858 IN BRAZIL
(HYMENOPTERA: FORMICIDAE).

Dissertação apresentada ao curso de Pós-Graduação em Entomologia, setor de Ciências Biológicas, Universidade Federal do Paraná, como requisito parcial à obtenção do título de Mestre em Entomologia.

Orientador: John Edwin Lattke Bravo

CURITIBA

2020

Universidade Federal do Paraná
Sistema de Bibliotecas
(Giana Mara Seniski Silva – CRB/9 1406)

Marcineiro, Frederico Rottgers
Review of the ant genus *Pachycondyla* Smith, 1858 in Brazil
(Hymenoptera: Formicidae). / Frederico Rottgers Marcineiro. – Curitiba,
2020.
111 p.: il.

Orientador: John Edwin Lattke Bravo

Dissertação (mestrado) - Universidade Federal do Paraná, Setor de
Ciências Biológicas. Programa de Pós-Graduação em Entomologia.

1. Formiga. 2. Análise cladística. 3. Inseto – Filogenia. 4. Morfologia
(Biologia). 5. Taxonomia. I. Título. II. Lattke, John Edwin. III. Universidade
Federal do Paraná. Setor de Ciências Biológicas. Programa de Pós-
Graduação em Entomologia.

CDD (22. ed.) 595.796



MINISTÉRIO DA EDUCAÇÃO
SETOR DE CIÊNCIAS BIOLÓGICAS
UNIVERSIDADE FEDERAL DO PARANÁ
PRÓ-REITORIA DE PESQUISA E PÓS-GRADUAÇÃO
PROGRAMA DE PÓS-GRADUAÇÃO CIÊNCIAS BIOLÓGICAS
(ENTOMOLOGIA) - 40001016005P5

TERMO DE APROVAÇÃO

Os membros da Banca Examinadora designada pelo Colegiado do Programa de Pós-Graduação em CIÊNCIAS BIOLÓGICAS (ENTOMOLOGIA) da Universidade Federal do Paraná foram convocados para realizar a arguição da Dissertação de Mestrado de **FREDERICO ROTTGERS MARCINEIRO** intitulada: **Review of ant genus Pachycondyla, Smith, 1858 in Brazil (Hymenoptera: Formicidae)**, sob orientação do Prof. Dr. JOHN EDWIN LATTKE BRAVO, que após terem inquirido o aluno e realizada a avaliação do trabalho, são de parecer pela sua APROVAÇÃO no rito de defesa.

A outorga do título de mestre está sujeita à homologação pelo colegiado, ao atendimento de todas as indicações e correções solicitadas pela banca e ao pleno atendimento das demandas regimentais do Programa de Pós-Graduação.

CURITIBA, 21 de Fevereiro de 2020.

JOHN EDWIN LATTKE BRAVO

Presidente da Banca Examinadora (UNIVERSIDADE FEDERAL DO PARANÁ)

RODRIGO DOS SANTOS MACHADO FEITOSA

Avaliador Interno (UNIVERSIDADE FEDERAL DO PARANÁ)

THIAGO SANCHES RANZANI DA SILVA

Avaliador Externo (UNIVERSIDADE FEDERAL DO PARANÁ)

MÔNICA ANTUNES ULYSSÉA

Avaliador Externo (MUSEU DE ZOOLOGIA DA UNIVERSIDADE DE SÃO PAULO)

AGRADECIMENTOS

Primeiramente julgo necessário agradecer à minha família. Meu pai, minha mãe, meus dois irmãos que em momento algum falharam comigo durante essa caminhada. Obrigado por sempre me demonstrarem suporte, quer seja emocional, intelectualmente ou até mesmo financeiramente quando precisei viajar a trabalho ou participar de congresso. Tenho certeza que sem esse apoio essa caminhada seria imensamente mais difícil, por esse privilégio eu agradeço imensamente. Obrigado aos meus irmãos que sempre foram parceiros, quer seja para conversas de desabafo ou para curtir um bom momento dando risadas juntos, obrigado por sempre estarem a disposição e pelas horas perdidas em trânsito indo me buscar na rodoviária todas as vezes que fui a Florianópolis, amo vocês.

Agradeço também aos meus outros familiares, às minhas duas avós que sempre demonstraram amor incondicional e muito orgulho de mim. Aos tios, tias, primos e primas muito obrigado pelo calor e alegria que a convivência com vocês sempre me trouxe. Desejo que todas as pessoas possam desfrutar de pessoas tão boas e amáveis como vocês são para mim.

Aos meus amigos que sempre estavam lá para me apoiar e animar quando os tempos foram sombrios, meu eterno agradecimento. Muito obrigado aos meus irmãos da BIO UFSC 2012 que nunca faltaram com bom humor e parceria. Muito obrigado aos meus amigos que sempre me receberam em Florianópolis com muito bom humor e diversão nas sexta-feiras a noite, esses momentos de lazer com certeza foram essenciais para aliviar muito stress que acumulei nessa caminhada. Não posso deixar de agradecer ao meu irmão de outra mãe, Antônio, que sempre foi ótima companhia durante todas as etapas da minha vida e não falhou em me acompanhar em mais essa etapa. Não menos importante para mim foi a alegria de me reaproximar de uma antiga amizade e que voltou a se apresentar nos momentos que mais precisei, foi paciente e sempre procurou me ajudar a ver o lado bom de cada pensamento que tive, me ajudou em muitos momentos a lutar com sentimentos muito negativos e foi responsável por me trazer paz e aconchego em momentos obscuros, muito obrigado Elisa, por ser essa amiga espetacular e por toda ajuda que você me deu.

Agradeço agora aos amigos que fiz em Curitiba, todos os integrantes do Feitosa Lab, Alê, Aline, Carol, Jaque, Mila, Nati, Pá, Thai, Thi e Wes e a rainha desse ninho

Rodrigo. Agradeço os meus irmãos de ninho Leo, Amanda, Adrian e à formiga rainha John, que se mostrou ser não só um excelente pesquisador mas também um excelente ser humano. A vocês obrigado por todas as conversas e conhecimento compartilhado, pelo estímulo de novas ideias e novas linhas de raciocínio, quer seja quando eu pedi conselhos ou em conversas soltas. Todos vocês foram fundamentais no desenvolvimento desse trabalho.

Obrigado aos amigos da pós graduação, que cursaram disciplinas comigo, que me auxiliaram em alguns momentos até mesmo em conversas de corredor. É uma alegria estar cercado de ótimos pesquisadores.

Obrigado ao Prof. Rodrigo Feitosa por estar sempre disposto a ajudar, por disponibilizar equipamentos do seu laboratório para aquisição de imagens e por fazer parte da banca avaliadora desse trabalho. Agradeço a Dra. Mônica Ulyssea por me receber e me dar suporte durante os dias que estive no Museu de Zoologia da USP, pela inspiração que é presenciar a leveza e o bom humor que sempre transparece, é sempre muito bom estar em companhia de pessoas assim e obrigado por aceitar fazer parte da banca avaliadora. Muito obrigado ao Dr. Thiago Sanches pela parceria e contribuição com ideias e conhecimento morfológico durante o meu mestrado e pelo aceite do meu convite para avaliar esse trabalho. Agradeço também ao Prof. Gabriel Melo pela contribuição com literatura e também por aceitar ser membro suplente da banca avaliadora.

Agradeço a Universidade Federal do Paraná por me receber em seu campus, ao Departamento de Zoologia por me dar estrutura para trabalhar e ao Programa de Pós Graduação em Entomologia por proporcionar um curso tão espetacular como é o mestrado em entomologia, com professores que são referência nos tópicos que abordaram, sempre com excepcional qualidade.

Por último, mas não menos importante, agradeço ao CNPq por disponibilizar a bolsa de estudo a qual desfrutei durante dois anos e que foi essencial para minha estadia em Curitiba e para o início e conclusão desse trabalho. Espero que muita pesquisa ainda possa ser auxiliada por esse órgão governamental espetacular e que a sua integridade perdure, mesmo passando por tempos turbulentos, de ataque à pesquisa no país e com constantes tentativas de obstruir a pesquisa, descreditar o pesquisador e rumar ao obscurantismo.

“Rather than love, than money, than faith, than fame, than fairness... give me truth” – Henry David Thoreau, Walden.

RESUMO

Pachycondyla é um gênero da subfamília Ponerinae, é composto de formigas caçadoras epigéicas e generalistas. Recentemente o gênero foi propriamente separado dos demais grupos próximos, majoritariamente a partir de evidências moleculares (Schmidt & Shattuck, 2014). Alguns autores revisaram o gênero ao longo do tempo, sendo as revisões mais proeminentes as de Kempf (1961) e MacKay & MacKay (2010). No Brasil esse gênero apenas foi estudado por Kempf (1961) cuja revisão é considerada a mais próxima da delimitação atual do gênero. No presente trabalho, reviso a ocorrência de espécies de *Pachycondyla* no Brasil, atualizo distribuições, refaço descrições de forma padronizada e detalhada e apresento uma chave dicotômica de identificação para todas as espécies conhecidas do gênero. *Pachycondyla curiosa* não se trata de uma espécie de *Pachycondyla* e um novo gênero deve ser proposto para ela. As identidades de *P. fuscoatra* e *P. impressa* são redefinidas. Uma nova espécie é descrita (*Pachycondyla* sp.n). A morfologia de *Pachycondyla harpax* é explorada e discutida, porém continua sendo o maior problema taxonômico do gênero, sendo esta provavelmente um complexo de espécies crípticas, as quais apenas a aplicação de técnicas de taxonomia integrativa, combinando estudos morfológicos, biogeográficos e moleculares, deve ser capaz de resolver.

Palavras-chave: Formigas, Taxonomia, Morfologia, Fauna Brasileira, Identificação

ABSTRACT

Pachycondyla is an ant genus of the subfamily Ponerinae, species of this genus are generalist ground dwellers. In recent studies the genus was splited from closely related groups, mostly based on molecular evidence (Schmidt & Shattuck, 2014). Through time, several authors revised the genus, with major revisions by Kempf (1961) and MacKay & MacKay (2010). In Brazil this genus was revised only by Kempf (1961), of which his revision is considered to be the closes to real *Pachycondyla*. Here I revise the occurrence of *Pachycondyla* species in Brazil, update distribution data, describe in detail all Brazilian species and I provide a species identification key to all *Pachycondyla* species. *Pachycondyla curiosa* is not considered to be *Pachycondyla* and a new genus should be proposed to properly place this species. The identities of *Pachycondyla fuscoatra* and *P. impressa* are discussed and redefined. A new species is described (*Pachycondyla* sp. n). *Pachycondyla harpax* morphology is explored and discussed, but still is a major taxonomic problem and probably a species complex. Integrative taxonomy, combining morphology, biogeography and molecular analyses should resolve this problem.

Keywords: Ants, Taxonomy, Morphology, Brazilian fauna, Identification

SUMÁRIO

SUMÁRIO.....	10
INTRODUÇÃO.....	12
REFERÊNCIAS	17
CAPITULO I – Review of ant genus <i>Pachycondyla</i> Smith, 1858 in Brazil (Hymenoptera: Formicidae)	21
1- Introduction	21
2- Material and Methods.....	23
2.1- Material acquisition and depositary institutions	23
2.2- Morphological terminology	24
2.3- Characters of interest.....	24
2.4- Measurements	25
2.5- Descriptions.....	26
2.6- Species concept	26
2.7- Distribution maps	26
2.8- Image acquisition	26
2.9- Examined material.....	26
3- Results and Discussion.....	26
3.1- Taxonomic synopsis	27
3.2- Genus <i>Pachycondyla</i>	26
3.2.1- Worker Diagnosis	28
3.2.2- Comments on genus delimitation.....	28
3.2.3- Gyne diagnosis	29
3.2.4- Comments on gyne.....	29
3.2.5- Male diagnosis	29
3.2.6- Comments on winged male characters.....	30
3.3- Key to <i>Pachycondyla</i> species based on workers	30
3.4- <i>Pachycondyla crassinoda</i> (Latreille, 1802)	36

3.5- <i>Pachycondyla fuscoatra</i> (Rogers, 1861).....	43
3.6- <i>Pachycondyla harpax</i> (Fabricius, 1804)	48
3.7- <i>Pachycondyla impressa</i> (Roger, 1861).....	59
3.8- <i>Pachycondyla inca</i> Emery, 1901	66
3.9- <i>Pachycondyla lenis</i> Kempf, 1961	71
3.10- <i>Pachycondyla lenkoi</i> Kempf, 1962	77
3.11- <i>Pachycondyla purpurascens</i> Forel, 1899	83
3.12- <i>Pachycondyla striata</i> Smith, 1858	88
3.13- <i>Pachycondyla</i> sp. n.....	100
4- Conclusions	105
5- References	106

INTRODUÇÃO

Formigas são um dos organismos terrestres mais bem sucedidos, quase qualquer local que alguém pode ir haverá uma formiga por perto (Hölldobler & Wilson, 1990). Reconhecidas pela comunidade não especializada, existem as formigas grandes, pequenas, amarelas, pretas e marrons. No entanto, com o auxílio de uma lupa ou microscópio, formigas apresentam magníficas variações em tamanho, forma, cor e caracteres que possam sugerir comportamentos ecológicos especializados, como modificações nas mandíbulas, no tamanho das pernas dianteiras, traseiras, ausência ou auto desenvolvimento de olho composto.

Desde seu surgimento a partir de vespas spheciformes entre 139 – 158 milhões de anos atrás (Lapolla *et al.*, 2013; Johnson *et al.*, 2013) elas desenvolveram eusocialidade com diferentes formas de organização. Sua dominância terrestre pode ser expressada por alguns exemplos, como o fato de que em uma floresta tropical, a biomassa de formigas encontradas em um metro quadrado de serapilheira é maior que o de qualquer outro organismo, nesse mesmo local (Wilson, 1987). Formigas podem ser encontradas abaixo do solo, em cima do solo, na serapilheira, sobre a vegetação e no dossel. Sua capacidade de explorar uma grande variedade de fontes de alimento e poderem nidificar em praticamente qualquer lugar possibilitam uma incrível diversidade.

Formigas nidificam em todos os ecossistemas da Terra, da Tundra até as florestas tropicais (Kaspari, 2005), numa grande variação de temperaturas, suportando o sol do meio dia no deserto (Lighton & Wehner, 1993) até as temperaturas congelantes da Tundra (Gregg, 1972). Seu papel ecológico é de fundamental importância para os ecossistemas, como dispersores de semente, auxiliam no consumo de matéria em decomposição, movimentam o solo e interagem diretamente com organismos de todos os níveis tróficos (Alonso & Agosti, 2000).

Com essa diversidade de habitats terrestres, é natural esperar um enorme número de espécies compondo essa família. Atualmente, Formicidae conta com 17 subfamílias, 334 gêneros válidos e 13,599 espécies válidas (Bolton, 2019). Esse número, no entanto, não representa o real número de espécies existentes de formigas, considerando que em 1993 se conhecia 9,536 espécies descritas (Bolton, 1995), comparadas com as 13,599 espécies descritas atualmente, 4,063 novas espécies foram descritas em 26 anos,

resultando numa média de 156 novas espécies de formiga descritas a cada ano. Entre sinonímias e novas combinações de nomes, o número de espécies inéditas para a ciência ainda é positivo. Estimativas sugerem que atualmente existem mais de 21,000 espécies de formiga (Agosti & Johnson, 2003).

A partir de Creighton (1950) a mirmecologia não encoraja descrições de subespécies nem variações específicas com diferentes nomes. Espécies devem representar táxons bons filogeneticamente, assim como níveis taxonômicos superiores. Classificações de subfamílias, gêneros e espécies devem representar a história evolutiva do grupo, possibilitando acesso rápido de tais informações a partir da identificação, assim como dados morfológicos, ecológicos, fisiológicos e demais dados a respeito daquela espécie.

Todas as formigas existentes pertencem à família Formicidae. Brown (1954) propôs sua primeira filogenia e desde então a monofilia desse grupo sempre foi corroborada quer seja por dados morfológicos (Keller, 2011) ou moleculares (Johnson *et al.*, 2013; Branstetter *et al.*, 2017; Economo *et al.*, 2018).

Formicidae é separada em dois clados, formicoide e poneroide, que recentemente foram confirmados como monofiléticos. Esses dois clados são irmãos de Leptanillinae. Martialinae é o grupo ancestral de todas as formigas, portanto posicionada na base da árvore filogenética de Formicidae (Moreau *et al.*, 2006; Brady *et al.*, 2006; Schmidt, 2013). O clado poneroide é formado por cinco subfamílias (Agroecomyrmecinae, Amblyoponinae, Paraponerinae, Ponerinae e Proceratiinae), sendo uma delas parte das “grandes quatro” subfamílias de formigas, a Ponerinae. Essa subfamília foi originalmente proposta como Ponérites (Lepeletier de Saint-Fargeau, 1835). Ponerinae se tornou um grupo parafilético que agregava um grupo de gêneros que possuíam colônias pequenas, organização social relativamente simples e alguns caracteres morfológicos em comum. Bolton (2003) reconheceu as simplesiomorfias que uniam esses gêneros no sentido antigo de Ponerinae e dividiu a subfamília em oito (Aectogitoninae, Amblyoponinae, Cerapachyinae, Ectatomminae, Heteroponerinae, Paraponerinae, Ponerinae e Proceratinae).

Membros da subfamília Ponerinae atualmente são diagnosticados possuindo tórulo completamente fundido com o lóbulo frontal; antenas com 12 segmentos (13 em machos); margens laterais dos lóbulos frontais como curtos semicírculos ou triângulos

atenuados, que quando vistos de frente possuem aparência de que posteriormente estão apertados; sutura promesonotal presente e flexível; orifício da glândula metapleural simples, abrindo lateralmente a posteriormente; lóbulos propodeais presentes; pecíolo (segmento abdominal II) distintamente separado posteriormente do primeiro segmento gastral (segmento abdominal III) com apenas uma estreita ligação com ele; pecíolo sem fusão tergoesternal; segmento abdominal III contínuo com os segmentos posteriores; segmentos abdominais III e IV com fusão tergoesternal; segmento abdominal IV com pré-esclerito e normalmente com constrição entre o pré- e pós-esclerito; espiráculos dos segmentos abdominais V – VII cobertos pela margem posterior dos escleritos anteriores; e ferrão presente e bem desenvolvido (Schmidt & Shattuck, 2014). Conta com 47 gêneros existentes e 1,248 espécies válidas ao redor do mundo (Bolton, 2019). Sua monofilia foi corroborada com dados moleculares robustos (Schmidt, 2013), concordando com estudos anteriores que já apontavam essa conclusão, porém contavam com dados mais limitados acerca de Ponerinae (Moreau *et al.*, 2006; Brady *et al.*, 2006).

Ponerinae é dividida em duas tribos (Platythyreini e Ponerini), a primeira é formada por apenas um gênero, *Platythyrea* Roger, 1863, enquanto a segunda engloba o restante dos gêneros de Ponerinae, com a inclusão recente da sinonímica tribo Thaumatomyrmecini, tornando-se assim uma tribo monofilética (Schmidt & Shattuck, 2014).

Ponerini por sua vez é dividida em grupos de gêneros, são eles os grupos *Harpegnathos*, *Hypoponera*, *Odontomachus*, *Pachycondyla*, *Plectroctene*, e *Ponera*. Dentro do grupo *Pachycondyla*, seu gênero de mesmo nome têm sido alvo de discussões taxonômicas ao longo do tempo, sofrendo sinonímias extensas (Brown, 1973) que perduraram até anos recentes, quando fortes evidências moleculares sobre sua parafilia foram levantadas (Schmidt, 2013). O gênero foi dividido em um grande número de distintos gêneros de modo a respeitar a monofilia dos agrupamentos, e uma nova definição para o gênero *Pachycondyla* foi estabelecida.

Formigas que compõem o gênero *Pachycondyla* são epigéicas, nidificam no solo, cavando suas galerias em bases de troncos, em baixo de pedras, madeira em decomposição ou em raízes de árvores. Não possuem dieta especializada, alimentando-se de pequenos artrópodes, sementes e matéria em decomposição. Sua distribuição é prioritariamente Neotropical, ocorrendo do norte da Argentina ao sul dos Estados Unidos, alcançando assim algumas latitudes do sul do Neártico, além de ocorrer em

algumas ilhas caribenhas (Kempf, 1961; MacKay & MacKay, 2010; Schmidt & Shattuck, 2014), Madagascar, Borneo, Filipinas e Sulawesi (Guénard et al., 2017). A espécie tipo do gênero é *Pachycondyla crassinoda* (Latrielle, 1802), o gênero possui até a realização desse trabalho 11 espécies viventes, seis espécies classificadas como *incertae sedis*, podendo não ser reais *Pachycondyla* e 18 espécies fósseis (Schmidt & Shattuck, 2014). Até hoje o Brasil possui registro de oito das 11 espécies válidas do gênero (Lattke, 2015; AntWiki, 2020).

Representantes desse gênero são diagnosticados por possuírem mandíbulas triangulares, margem anterior do clipeo sem dentes, sulco metanotal mais parecido com uma fraca sutura, espiráculo propodeal em forma de fenda, orifício da glândula metapleural com uma franja posterior em forma de “U” invertido, arólios ausentes, garras tarsais simples, pecíolo parecido com um bloco grosseiro, estridulito ausente entre os tergos abdominais III e IV, e uma fileira de cerdas grosseiras no hypopígio, em cada lado do ferrão (Schmidt & Shattuck, 2014).

A história taxonômica do gênero se inicia com sua descrição por Frederick Smith (1858), sem designação da espécie tipo para o gênero. Posteriormente Emery (1901) designou *Pachycondyla crassinoda* como sua espécie tipo (MacKay & MacKay, 2010; Schmidt & Shattuck, 2014).

Já em 1863, Roger e Mayr consideravam o gênero heterogêneo, propondo novos gêneros a partir de espécies que anteriormente eram consideradas como *Pachycondyla*. Posteriormente, Brown (1973) realizou extensa sinonímia desses gêneros e os agrupou novamente sob o nome de *Pachycondyla* (MacKay & MacKay, 2010; Schmidt & Shattuck, 2014), resultando em um gênero que abrigava 92 espécies Neotropicalais (MacKay & MacKay, 2010) e mais de 200 espécies ao redor do mundo. Na sua revisão das espécies Neotropicalais de *Pachycondyla*, MacKay & MacKay (2010) já indicavam a grande probabilidade de que o gênero, de acordo com a definição de Brown, era parafilético.

Três anos depois, Chris Smith (2013) publicou seu trabalho com análise filogenética de Ponerinae, utilizando dados moleculares, resultando em uma filogenia com fortes evidências da parafilía de *Pachycondyla*, porém seu trabalho não tinha a pretensão de realizar ações taxonômicas formais. Em 2014, Schmidt & Shattuck dividem *Pachycondyla* em 19 gêneros distintos, sendo eles 13 revividos de sinonímia

(*Bothroponera* Mayr, 1862, *Brachyponera* Emery, 1900, *Ectomomyrmex* Mayr, 1867, *Euponera* Forel, 1891, *Hagensia* Forel, 1901, *Megaponera* Mayr, 1862, *Mesoponera* Emery, 1900, *Neoponera* Emery, 1901, *Ophthalmopone* Forel, 1890, *Pachycondyla* Smith, 1858, *Paltothyreus* Mayr, 1862, *Pseudoneoponera* Donisthorpe, 1943 e *Pseudoponera* Emery, 1900) e quatro novos (*Austroponera*, *Buniapone*, *Fisheropone*, *Mayaponera*, *Parvaponera* e *Rasopone*).

Em seu trabalho, MacKay & MacKay (2010) dividem *Pachycondyla* em grupos de espécies, que compartilham características morfológicas. Dentre eles, o grupo de espécies *crassinoda* tornou-se o gênero *Pachycondyla*, com a adição de uma espécie que pertencia ao grupo *stigma* (*Pachycondyla lenkoi* Kempf, 1962), após Schmidt & Shattuck (2014).

No Brasil exemplares do gênero *Pachycondyla* são comumente encontrados em áreas preservadas, parques ou até em áreas urbanas altamente antropizadas. São formigas normalmente grandes, que forrageiam sozinhas. Apesar de se esconderem ou fugirem quando perturbadas, se forem manuseadas podem ferir, causando muita dor.

Apesar da abundante fauna, poucos trabalhos foram realizados abordando esse gênero no Brasil. Kempf (1961) revisou a fauna brasileira de *Pachycondyla*, sendo o primeiro estudo no hemisfério sul a revisar o gênero, propondo uma chave de identificação para as espécies e até hoje é o único trabalho com as espécies brasileiras. Sua revisão é considerada a mais próxima da real definição de *Pachycondyla*, com a adição de apenas duas espécies que hoje não estão incluídas no gênero (*P. magnifica* e *P. metanotalis*). Em seu trabalho ele aborda seis espécies de *Pachycondyla* (*P. crassinoda*, *P. fuscoatra*, *P. harpax*, *P. impressa*, *P. lenis* e *P. striata*), comentando morfologia, distribuição, ecologia e performando atos taxonômicos formais como sinônimas e propostas de novas espécies.

Dentre suas sinônimas, a mais extensa foi sinonimizar quatro espécies com *P. impressa*, essa ação acabou gerando incertezas taxonômicas a respeito da sua identidade e distribuição. Posteriormente MacKay & MacKay (2010) abordaram esse problema, revivendo de sinônima três espécies (*P. cearensis*, *P. inca* e *P. purpurascens*), porém dessa vez sinonimizando *P. cearensis* com *P. inca*. No entanto, os argumentos morfológicos dos MacKay não abordam outros aspectos a não ser diferenças no tamanho do clipeo dessas espécies e esculturação na mandíbula. A caracterização

morfológica de *P. impressa* continua confusa no trabalho dos MacKay, com descrição que se confunde com a de *P. fuscoatra*, espécie essa que também é mencionada por Kempf (1961) como uma provável sinônima de *P. impressa*.

Desde a revisão de Kempf, nenhum outro estudo de revisão avaliou os espécimes depositados em coleções brasileiras, que abrigam material tipo de três espécies do gênero e volumoso material coletado vindo de numerosas coletas realizadas por todo o Brasil. Nem mesmo o trabalho de revisão do gênero no Paraguai, feito por Wild (2002) ou a revisão de espécies Neotropicais feita por MacKay & MacKay (2010) consultaram as coleções brasileiras. Como o Brasil é um dos maiores países da América Latina e possui reconhecida biodiversidade, o estudo das suas coleções é de fundamental importância para compreender a distribuição dessas espécies na região.

Neste trabalho, realizo o estudo das espécies de *Pachycondyla* que ocorrem no Brasil, contando com a contribuição de 11 instituições nacionais, incluindo a coleção do Museu de Zoologia da Universidade de São Paulo (MZSP) que abriga a maior parte dos exemplares examinados por Kempf em seu trabalho. A delimitação morfológica do gênero é retrabalhada, descrições das espécies são atualizadas, mapas de distribuição fornecidos assim como uma nova chave dicotômica para identificação das espécies do gênero.

REFERÊNCIAS

- Agosti, D., Johnson, N. F., 2003. La Nueva taxonomia de hormigas, p. 45-48. *In* Fernández, F. (Ed). **Introducción a las hormigas de la región Neotropical**. Bogotá: Instituto Humboldt, 2003. 424 p.
- Alonso, L. E.; Agosti, D., 2000. Biodiversity studies, monitoring, and ants: an overview, p.1-8. *In*: Agosti, D.; Majer, J. D.; Alonso, L. E; Schultz, T. R. (Eds). **Ants: standard methods for measuring and monitoring biodiversity**. Washington: Smithsonian Institution Press. p.1-8.
- AntWiki. Available from <<https://www.antwiki.org/wiki/Brazil#Pachycondyla>>. Accessed at 17, January, 2020.
- Bolton, B., 1995. A new general catalogue of the ants of the world. Cambridge, Mass.: Harvard University Press, 504 pp.
- Bolton, B., 2003. Synopsis and Classification of Formicidae. **Memoirs of the American Entomological Institute**, v. 71, p. 374.

Bolton, B., 2019. **An online catalog of the ants of the world**. Available from <<http://antcat.org>>. Accessed at 22, October, 2019.

Brady, S. G.; Schultz, T. R.; Fisher, B. L.; Ward, P. S., 2006. Evaluating alternative hypotheses for the early evolution and diversification of ants. **Proceedings of the National Academy of Sciences of the United States of America**, v. 103, n. 48, p. 18172–18177.

Branstetter, M. G.; Danforth, B. N.; Pitts, J. P.; Faircloth, B. C.; Ward, P. S.; Buffington, M. L.; Brady, S. G., 2017. Phylogenomic Insights into the Evolution of Stinging Wasps and the Origins of Ants and Bees. **Current Biology**, v. 27, n. 7, p. 1019–1025.

Brown, Jr, W. L., 1954. Remarks on the internal phylogeny and subfamily classification on the family Formicidae. **Insectes Sociaux**, n. 1, p. 21-31.

Brown, Jr, W. L., 1973b. A comparison of the Hylean and Congo-West African rain forest ant faunas, p. 161-185. *In*: Meggers, B. J.; Ayensu, E. S.; Duckworth, W. D. (Eds.) *Tropical forest ecosystems in Africa and South America: a comparative review*. Washington, D.C.: **Smithsonian Institution Press**, viii + 350 pp.

Creighton, W. S., 1950. The Ants of North America. **Bulletin: Museum of Comparative Zoölogy**, n. 104, p. 1-585.

Economo, E. P.; Narula, N.; Friedman, N. R.; Weiser, M. D.; Guénard, B., 2018. Macroecology and macroevolution of the latitudinal diversity gradient in ants. **Nature Communications**, v. 9, n. 1, p. 1–8.

Emery, C., 1901b. Notes sur less sous-familles des Dorylines et Ponérines (Familles des Formicides). **Annales de la Société Entomologique de Belgique**, v. 45, p. 32-54.

Gregg, R. E., 1972. The Northward distribution of ants in north america. **The Canadian Entomologist**, v. 104, p. 1073–1091.

Guénard, B., Weise, M., Gomez, K., Narula, N., Economo, E. P., 2017. The Global Ant Biodiversity Informatics (GABI) database: a synthesis of ant species geographic distributions. **Myrmecological News**. v. 24, p. 83-89.

Hölldobler, B.; Wilson, E. O., 1990. **The ants**. Cambridge: Harvard University Press, 732 p.

Johnson, B. R.; Borowiec, M. L.; Chiu, J. C.; *et al.*, 2013. Phylogenomics resolves evolutionary relationships among ants, bees, and wasps. **Current Biology**, v. 23, n. 20, p. 2058–2062.

Kaspari, M., 2005. Global energy gradients and size in colonial organisms : Worker mass and worker number in ant colonies. **Proceedings of the National Academy of Sciences**, v. 102, n. 14, p. 5079–5083.

Keller, R.A. 2011. A phylogenetic analysis of ant morphology (Hymenoptera: Formicidae) with special reference to the poneromorph subfamilies. **Bulletin of the American Museum of Natural History**, 355: p. 1-90.

Kempf, W. W., 1961e. As formigas do gênero *Pachycondyla* Fr. Smith no Brasil (Hymenoptera: Formicidae). **Revista Brasileira de Entomologia**, Curitiba, v. 10, p. 189 - 204.

Lapeletier de Saint-Fargeau, A., 1835. **Histoire naturelle des insectes. Hyménoptères. Tome I**. Paris: Roret, 547 pp.

Lapolla, J. S.; Dlussky, G. M.; Perrichot, V., 2013. Ants and the Fossil Record. **Annual Review of Entomology**, v. 58, n. 1, p. 609–630.

Lattke, J. E., 2015. Estado da arte sobre a taxonomia e filogenia de Ponerinae do Brasil. p. 55-73. *In*: Delabie, J. H. C.; Feitosa, R. M.; Serrão, J. E.; Mariano, C. S. F.; Majer, J. D. (Eds). **As formigas poneromorfas do Brasil**. Ilhéus: Universidade Estadual de Santa Cruz, 2015. 477 pp.

Lighton, J. R. B; Wehner, R., 1993. Ventilation and respiratory metabolism in the thermophilie desert ant, *Cataglyphis bicolor* (Hymenoptera , Formicidae). **Journal of Comparative Physiology B**, v. 163, p. 11–17.

MacKay, W. P., MacKay, E. E., 2010. **The systematics and biology of the new world ants of the genus *Pachycondyla* (Hymenoptera: Formicidae)**. The Edwin Mallen Press. Lewinston, 660 p.

Mayr, G., 1863a. Formicidarum index synonymicus. Verhandlungen der Kaiserlich-Königlichen **Zoologisch-Botanischen Gesellschaft in Wien**, v. 13, p. 385-460.

Moreau, C. S.; Bell, C. D.; Vila, R.; Archibald, S. B.; Pierce, N. E., 2006. Phylogeny of the ants: Diversification in the age of angiosperms. **Science**, v. 312, n. 5770, p. 101–104.

Roger, J., 1863b. Verzeichniss der Formiciden-Gattungen und Arten. **Berlin Entomologische Zeitschrift**, v. 7, p. 1-65.

Schmidt, C., 2013. Molecular phylogenetics of ponerine ants (Hymenoptera: Formicidae: Ponerinae). **Zootaxa**, Auckland, v. 3647, n. 2, p. 201-250.

Schmidt, C. A.; Shattuck, S. O., 2014 The Higher Classification of the Ant Subfamily Ponerinae (Hymenoptera: formicidae, with a Review of Ponerine Ecology and Behavior. **Zootaxa**, Auckland, v. 3817, n. 1, p. 001-242.

Smith, F., 1858a. Catalogue of hymenopterous insects in the collection of the British Museum. Part VI. Formicidae. London. **British Museum**, p. 216.

Wilson, E. O., 1987. The Little Things That Run the World (The Importance and Conservation of Invertebrates). **Blackwell Publishing for Society for Conservation Biology**, v. 1, n. 4, p. 344–346.

Wild, A. L., 2002. The Genus *Pachycondyla* (Hymenoptera: Formicidae) in Paraguay. **Boletín del Museo Nacional de Historia Natural de Paraguay**, v. 14 (1-2), p. 1-18.

CAPITULO I – Review of ant genus *Pachycondyla* Smith, 1858 in Brazil (Hymenoptera: Formicidae)

1- Introduction: The genus *Pachycondyla* is within the Ponerinae, a pantropical ecologically dominant hunting ant subfamily, which comprises 47 extant valid genera and 1,248 valid species worldwide (Bolton, 2019). The type species of *Pachycondyla* is *P. crassinoda* (Latreille, 1802). *Pachycondyla* species are commonly found on the forest floor and never on vegetation or in the canopy. Nests are in soil, opening their galleries on trunk bases, under rocks, rotten logs or tree roots. They are generalist foragers, eating small arthropods, seeds and decaying matter. Representatives of this genus are resistant to habitat disturbance and are found in either preserved forest areas or in highly disturbed areas such as city parks. The genus ranges from northern Argentina to southern Louisiana, USA, plus Madagascar, Borneo, Philippines, Sulawesi and Maluku islands (Guénard et al., 2017), being mostly Neotropical to southern Neartic. (Kempf, 1961; MacKay & MacKay, 2010).

The genus is diagnosed by having triangular mandibles, the anterior clypeal margin without a projecting tooth, lack of a preocular carina, the metanotal sulcus resembling a weak suture, a slit-shaped propodeal spiracle, the metapleural gland opening with a posterior inverted “U” shaped cuticular crest, lack of arolia, unarmed tarsal claws, blocklike petiolar node, lack of a stridulitrum between abdominal tergites III and IV and the sides of the hypopigium bearing a row of stout setae (Schmidt & Schattuck, 2014; Lattke, 2015).

The taxonomic history of this genus is complex and confusing, attracting great discussion through time. Frederick Smith described the genus in 1858 without

designating a type species, posteriorly designated by Emery (1901) as *P. crassinoda* (MacKay & MacKay, 2010; Schmidt & Shattuck, 2014).

In 1863 the genus *Pachycondyla* already was considered to be heterogeneous by Roger and Mayr (Kempf, 1961). Subsequent authors split the genus into other genera (Emery, 1900; Emery, 1901; Wheeler, 1936). As part of revisionary work with the ponerines *Pachycondyla*, Brown (1973) synonymizes a great number of genera in *Pachycondyla* without much justification (MacKay & MacKay, 2010; Schmidt & Shattuck, 2014) consequently resulting in a large genus with 92 Neotropical species in MacKay & MacKay, 2010 revision.

In 2013, Chris Schmidt publishes a molecular based phylogeny of the Ponerinae, with results that clearly point to the non-monophyly of the genus. In a subsequent publication (Schmidt & Shattuck, 2014) split *Pachycondyla* into 19 genera, reviving several previously synonymized genera (*Bothroponera*, *Brachyponera*, *Ectomomyrmex*, *Euponera*, *Hagensia*, *Megaponera*, *Mesoponera*, *Neoponera*, *Ophthalmopone*, *Pachycondyla*, *Paltothyreus*, *Pseudoneoponera* and *Pseudoponera*) and proposing some new ones (*Austroponera*, *Buniapone*, *Fisheropone*, *Mayaponera*, *Parvaponera* and *Rasopone*).

The *crassinoda* species group (*P. constricticeps*, *P. crassinoda*, *P. curiosa*, *P. fuscoatra*, *P. harpax*, *P. impressa*, *P. inca*, *P. latickei*, *P. lenis*, *P. purpurascens* and *P. striata*) in the MacKay & MacKay (2010) revision became the genus *Pachycondyla*, with the inclusion of one species from *stigma* species group (*P. lenkoi*). To date, 11 extant species are considered to compose the genus, with six species considered *incertae sedis*, remaining as *Pachycondyla* until formal nomenclatural act properly resolves their placement, plus eighteen fossil species (Schmidt & Shattuck, 2014). Until now, eight of the eleven species were considered to occur in Brazil (Lattke, 2015; AntWiki, 2020).

Kempf (1961) worked with *Pachycondyla* fauna of Brazil. It is the first study to work with this genus in southern hemisphere with an identification key. To date is the only study of *Pachycondyla* in Brazil and considered to be the closest to true *Pachycondyla*, only with two non-*Pachycondyla sensu strictu* species (*Pachycondyla magnifica* and *Pachycondyla metanotalis*). Kempf discussed six species of what is considered *Pachycondyla* (*P. crassinoda*, *P. fuscoatra*, *P. harpax*, *P. impressa*, *P. lenis*

and *P. striata*). He synonymizes four species into *Pachycondyla impressa*, creating a taxonomic uncertainty about the identity and distribution of this species, being one of the remaining problems of the genus. He also argues that *P. fuscoatra* does not occur in Brazil, besides admitting that *P. fuscoatra* could be another synonymy of *P. impressa*. MacKay & MacKay (2010) briefly discuss the *impressa* synonymy and revives three species from it (*P. cearensis*, *P. inca* and *P. purpurascens*) and synonymizes *P. cearensis* into *P. inca*. The rest of synonymies remain sensu Kempf.

Since Kempf's review of the genus, no other major studies on the group have analyzed specimens from Brazilian institutions, including a revision of the genus in Paraguay by Wild (2002) and for Neotropical region by MacKay & MacKay (2010). Brazilian collections have type specimens of four *Pachycondyla* species, including the holotype of *P. lenkoi* and the entire type series of *P. lenis*. Since Brazil is the largest country in Latin America and has great biodiversity, studying local collections is of fundamental importance to understand the distribution of this species in Latin America.

We review workers of all extant *Pachycondyla* species known from Brazil. A new synonymy for one species is made and we exclude *P. curiosa* MacKay & MacKay, 2010 from consideration as it probably represents a different genus. We update the diagnosis of the group and its distribution in Brazil, redescribe workers of all Brazilian *Pachycondyla* species and provide standardized measurements for them, describe a new species, with worker and gyne and the previously unknown gyne of *P. lenkoi*. A species identification key to all extant *Pachycondyla* based on workers is provided.

2- Material and Methods:

2.1- Material acquisition and depositary institutions:

The following abbreviations and names represents all depositary institutions that contributed with this work through loans or that contain type material of species present in this work. In the case of examination of images, and not the physical specimen, an asterisk follows the institutional acronym.

(BMNH*) The Natural History Museum, London, U.K.

(DZUP) Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, Brazil

(IMLA*) Fundación Miguel Lillo, Tucuman, Argentina

(INPA) Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil

(**LACM***) Los Angeles County Museum of Natural History, Los Angeles, USA

(**MEPN**) Museo Escuela Politécnica Nacional, Quito, Ecuador

(**MHNG***) Muséum d'histoire naturelle de la Ville de Genève, Geneva, Switzerland

(**MPEG**) Museu Paraense Emílio Goeldi, Belém, Brazil

(**MSNG***) Museo Civico di Storia Naturale “Giacomo Doria”, Genova, Italy

(**MCZ***) Harvard Museum of Comparative Zoology, Cambridge, USA

(**MZSP**) Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil

(**NHMB**) Naturhistorisches Museum Basel, Basel, Switzerland

(**NHMD***) Natural History Museum of Denmark, Copenhagen, Denmark

(**OUMNH***) Oxford University Museum of Natural History, Oxford, U. K.

(**UFAC**) Universidade Federal do Acre, Rio Branco, Brazil

(**UFPel**) Universidade Federal de Pelotas, Pelotas, Brazil

(**UFRGS**) Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil

(**UFSC**) Universidade Federal de Santa Catarina, Florianópolis, Brazil

(**UFSM**) Universidade Federal de Santa Maria, Santa Maria, Brazil

(**UFU**) Universidade Federal de Uberlândia, Uberlândia, Brazil

(**UFV**) Universidade Federal de Viçosa, Viçosa, Brazil

(**ZMHB***) Berlin Museum für Naturkunde der Humboldt-Universität, Berlin, Germany

2.2- Morphological terminology: We follow Keller, 2011 for general morphology, Richter *et al.*, 2019 for head morphology, Harris, 1979 for sculpturing, Boudinot, 2015 for alate morphology, and Wilson, 1955 for pilosity. The terms in the Hymenoptera Anatomy Ontology (<http://portal.hymao.org>) was also used for morphological concepts.

2.3- Characters of interest: The following characters were used to distinguish the species from one another: mandibular sculpturing, clypeus medial area shape; clypeus length, clypeal carina, sculpturing on dorsum and ventrum of head, humeral carina degree of development, dorsolateral pronotum overhang of lateral pronotal surface, mesosoma

sculpturing, mesopleural suture, petiole shape, petiole sculpturing, subpetiolar process shape, prora shape, pygidial and hypopygial teeth, clypeal distance, relative eye length and petiolar index.

2.4- Measurements: Specimen measurements were obtained using a millimetric reticle on a 10x ocular lens, attached to a ZEISS® Stemi SV 6 stereo microscope. Examined type material measurements are designated apart from other samples. Measurements follows those of Wild, 2002, with the addition of eye length, relative eye Length, clypeal distance, cephalic index, petiolar index and post petiole length.

Head width (HW): Maximum width of head capsule in full face view.

Head length (HL): Length of head capsule in full face view, from mid-point of anterior clypeal margin to mid-point of posterior head margin.

Clypeal distance (CD): Distance from anteromedian clypeal margin to posteromedian clypeal margin.

Cephalic Index (CI): $HW/HL \times 100$

Scape length (SL): Maximum straight-line length of scape, excluding basal constriction.

Eye length (EL): Maximum eye length measured along maximum diameter.

Relative eye index (REI): $EL/HW \times 100$

Weber's length (WL): Diagonal length of the mesosoma in lateral view, from where the pronotum meets the cervical shield to the posteroventral angle of the metapleuron.

Pronotal width (PnW): Maximum width of the pronotum in dorsal view

Hind tibia length (TL): Maximum metatibial length, measured from the proximal constriction, just before inserting the condyle, to the apex.

Nodal width (NW): Maximum width of the petiolar node in dorsal view

Nodal length (NL): Maximum length of the petiolar node in dorsal view

Petiolar Index (PetI): $NW/NL \times 100$

Post petiole length (PPL): Length of the post petiole (first gastral segment) from the mid-point of the anterior face to the mid-point of the posterior margin of the tergite.

2.5- Descriptions: Each species description is ordered from anterior to posterior (mandible to hypopigium), and from the dorsal to the ventral sclerites. Shape is considered first alongside with sculpturing, followed by pilosity and finally color. Given their similarity with the gynes, only workers are totally described, with the exception of previously unknown gynes that are first described here.

2.6- Species concept: A morphological approach (Baum & Donoghue, 1995) of the phylogenetic species concept (Nixon & Wheeler, 1990) is used, where upon a species is considered as the smallest aggregation of populations diagnosable by a unique combination of character states in comparable individuals. This concept assumes that this combination of characters is result of a unique evolutionary path shared by this group of individuals and diagnosable by morphological analyses.

2.7- Distribution maps: Distribution maps were made using QGIS Desktop 3.6 Noosa (QGIS, 2019). The SRC used was geographical coordinates, on grade, minutes and seconds. Only examined samples and type locations were included in distribution maps. Whenever geographical coordinate data are missing in the label, the coordinates from the central point of the smallest geographical unit on sample label were obtained using Google Maps.

2.8- Image acquisition: High-resolution images were obtained with an Axiocam 305 color coupled in Zeiss SteREO Discovery.V20, extended depth focus was made in the software Adobe Photoshop CC 2019.

2.9- Examined material: All samples examined are listed at the end of each species treatise following the pattern: COUNTRY: **state:** number caste, province or department, city, locality, geographic coordinates, date, (Collector) [depository institution];

Information between brackets is missing on the labels but was added during the course of the revision.

3- Results and Discussion:

3.1- Genus *Pachycondyla*:

The genus *Pachycondyla* includes eleven extant Neotropical species (*P. crassinoda* (Latreille, 1802), *P. fuscoatra* (Roger, 1861), *P. harpax* (Fabricius, 1804), *P. impressa* (Roger, 1861), *P. inca* Emery, 1901, *P. lattkei* MacKay & MacKay, 2010, *P. lenis* Kempf, 1961, *P. lenkoi* Kempf, 1962, *P. purpurascens* Forel, 1899, *P. striata* Smith,

1858 and *Pachycondyla* sp. n), plus four species classified as *insertae sedis* from Madagascar (*P. jonesii* (Forel, 1891)), Borneo (*P. vidua* (Smith, 1857)), Sulawesi (*P. unicolor* (Smith, 1860)), Philippines and Maluku islands (*P. solitaria* (Smith, 1860)). These paleotropical species are arguably not *Pachycondyla* therefore they are not considered in this work. The gyne of one species is unknown (*P. lattkei*) and four species lack descriptions of the male (*P. fuscoatra*, *P. lenis*, *P. lenkoi* and *P. purpurascens*). Ten out of eleven species are recorded from Brazil. *Pachycondyla lattkei* is the only species with no record from Brazil, therefore we will not discuss it here despite its inclusion in the species identification key. The genus is recorded from every state of the country with exception of Piauí and Rio Grande do Norte. It is unlikely that this genus is absent in these states and the lack of records is probably due to the lack of field collections.

One group of species (*P. fuscoatra*, *P. impressa*, *P. inca*, *P. lattkei*, *P. purpurascens* and *Pachycondyla* sp. n) shares great morphological similarities such as striate ventral surface of head, absence of humeral carina, thick petiolar node (Pell > 114) and longitudinal lateral striae on the pygidium. Kempf (1961) synonymized some of these species with *P. impressa* but they posteriorly were revived as valid species by MacKay & MacKay, (2010) (e. g. *P. inca* and *P. purpurascens*). Here we group these species into the *impressa* species group due to their morphological similarities.

3.2.1- Species list:

Pachycondyla crassinoda (Latreille, 1802): Brazil: Acre, Amazonas, Bahia, Goiás, Maranhão, Mata Grosso, Pará, Paraíba, Rondônia, Roraima, Rio Grande do Sul, São Paulo.

Pachycondyla fuscoatra (Roger, 1861): Brazil: Amazonas, Minas Gerais, Pará. Colombia.

Pachycondyla harpax (Fabricius, 1804): Brazil: Acre, Alagoas, Amazonas, Bahia, Distrito Federal, Espírito Santo, Goiás, Maranhão, Minas Gerais, Mato Grosso, Mato Grosso do Sul, Pará, Paraná, Pernambuco, Rondônia, Roraima, Rio Grande do Sul, Rio de Janeiro, Santa Catarina, São Paulo, Sergipe, Tocantins. Costa Rica: San José. Guiana Francesa: Cayenne.

Pachycondyla impressa (Rogers, 1861): Costa Rica: San José. Ecuador: Esmeraldas, Pichincha,. Panama: Ilha Barro Colorado. Suriname: La Paulle, Valle. Venezuela: La Toma.

Pachycondyla inca Emery, 1901: Peru: Macho Pichu, Valle Chanchamayo.

Pachycondyla lenis Kempf, 1961: Brazil: Paraíba, Paraná, Pernambuco, Rio de Janeiro, Santa Catarina, São Paulo, Sergipe.

Pachycondyla lenkoi Kempf, 1962: Brazil: Distrito Federal, Minas Gerais, São Paulo, Tocantins.

Pachycondyla purpurascens Forel, 1899: Brazil: Goiás, Pernambuco.

Pachycondyla striata Smith, 1858 **n. stat., n. senior syn** of *Pachycondyla constricticeps* MacKay & MacKay, 2010: Brazil: Acre, Bahia, Distrito Federal, Espírito Santo, Minas Gerais, Mato Grosso, Paraná, Pernambuco, Rio Grande do Sul, Rio de Janeiro, Santa Catarina, São Paulo.

Pachycondyla **sp. n.**: Brazil: Bahia, Minas Gerais, Mato Grosso, Pará, Pernambuco, Goiás, Rio de Janeiro, São Paulo. Venezuela: Margarita.

3.2.2- Worker Diagnosis:

- 1- Mandible triangular.
- 2- Anterior clypeal margin without two projecting teeth.
- 3- Absence of preocular carina.
- 4- Eye never surpassing posterior limit of frontal carina.
- 5- Metanotal groove at most present as a faint suture.
- 6- Arolium absent.
- 7- Tarsal claws unarmed.
- 8- Propodeal spiracle slit-shaped.
- 9- Metapleural gland orifice with a posterior U-shaped cuticular crest.
- 10- Petiole subquadrate, always forming a dorsal face.
- 11- Lack of stridulitrum between gastral tergites III and IV.
- 12- A row of strong setae along sides of hypopigium sides.

3.2.3- Comments on genus delimitation: Most diagnostic characters of *Pachycondyla* are not apomorphic. There is no character present in *Pachycondyla* that no other genera presents, except maybe the row of strong setae on hypopigium sides, but some *Neoponera*

species present some setae on the hypopigium that may be interpreted as strong setae. In fact, is the combination of the full list of characters that diagnoses a *Pachycondyla*. *Neoponera* presents slit-shaped propodeal spiracles, the metapleural gland with a U-shaped cuticular lip, and some have eyes not surpassing the frontal carina posterior limit but it never presents the full list of *Pachycondyla* diagnostic characters.

The hypopigial setae are variously developed. Some may be stout, others not. Some species of *Pachycondyla* also present a dense group of hairs on hypopigium, masking the stout setae.

Pachycondyla curiosa was described by MacKay & MacKay, 2010 under the old sense of the genus and it is not a *Pachycondyla sensu strictu*. The study of pictures from *P. curiosa* type (AntWeb [LACMENT226103](#), photography by John Lattke) are enough to observe important differences between *P. curiosa* and other *Pachycondyla* species. Namely, the mandible of *P. curiosa* is shorter than other *Pachycondyla*, with rounded apex. Very convex eyes surpassing the posterior limit of frontal carina, presence of arolia on the claws, the propodeal gland opening is not visible dorsally, and the lack of hypopigial stout setae diverge from the *Pachycondyla* diagnosis. The body sculpturing is unlike other *Pachycondyla* species and the petiolar shape diverges from the pattern in *Pachycondyla*. Although *P. curiosa* presents a thick petiole forming a dorsal face, the petiole of *P. curiosa* is slightly concave on anterior face and is higher posterad than anterad on dorsal face. Other *Pachycondyla* species present a convex petiolar anterior face and a dorsal margin that is higher than the posterior margin, normally with the posterior face curving anteriorly near the apex. *Pachycondyla curiosa* is not diagnosable as a *Pachycondyla*, it could be a member of an undescribed ponerine genus, and therefore there is no further discussion on this species in the present work.

3.2.4- Gyne diagnosis: Gynes of *Pachycondyla* are diagnosed with the same combination of characters as workers.

3.2.5- Comments on gyne: Gynes of *Pachycondyla* presents the overall mesosomal modifications of sclerites for wing muscles and are slightly larger than workers. Without major morphological differences compared with workers, species are easily diagnosable with gynes using the species identification key based on workers. The only species with a morphologically slightly diverging gyne from the workers is *P. lenkoi* (see [P. lenkoi](#) discussion).

3.2.6- Male diagnosis:

- 1- Palpal formula 4,5.
- 2- Maxillary palpomeres IV and V clearly longer than mandibular width.
- 3- Clypeus without rounded dorsal projection.
- 4- Length of wings rarely more than 1,0 cm.
- 5- Meso and metatibia with two pectinate spurs.
- 6- Propodeal spiracle slit shaped.
- 7- Absence of stridulitrum on abdominal pretergite IV.
- 8- Abdominal tergite VIII posteriorly with a differentiated spine.

3.2.7- Comments on winged male characters:

Males presents some morphological features similar to workers and gynes, such as the propodeal spiracle shape and lack of stridulitrum on the IV abdominal pretergite. The obvious head morphological modifications in males make it impossible to distinguish the diagnosable features to workers and gynes. Palpal formula, clypeal shape and absence of stridulitrum on IV abdominal pretergite are key to distinguish males of *Pachycondyla* from *Neoponera*. The presence of pretarsal arolia on males suggest that lack of it in workers and gynes are secondary losses.

Boudinot (2019) provides an identification key to genera and MacKay & MacKay (2010) presents a partial key to species based on males.

3.3- Key to *Pachycondyla* species based on workers.

1.1– Pygidium with two tooth-like cuticular projections (fig. 01)... *P. crassinoda*

1.2– Pygidium without two tooth-like cuticular projections (fig. 02)... 2

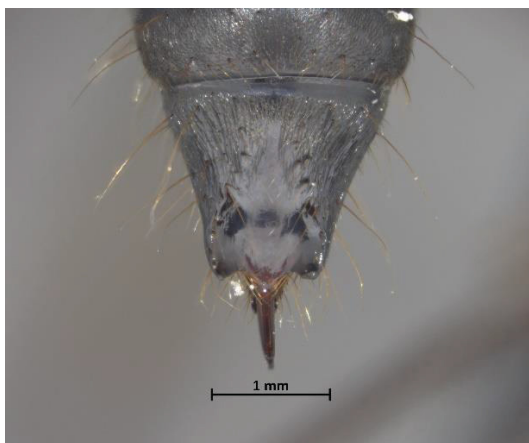


Fig. 01 – Pygidium of *P. crassinoda*

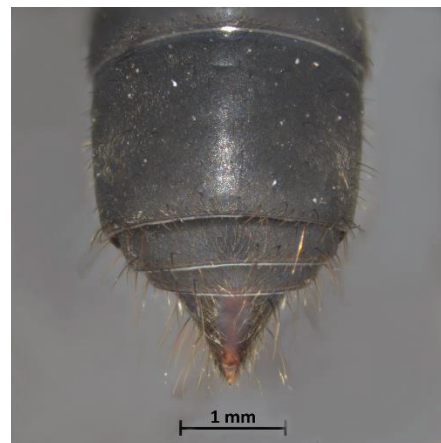


Fig. 02 – Pygidium of *P. striata*

2.1 – Clypeus with a central projection on anterior margin; color ferruginous (fig. 03)...
P. lenkoi

2.2 – Clypeus without a central projection on anterior margin; dark brown color (fig. 04)... 3



Fig. 03 – Clypeus of *P. lenkoi*

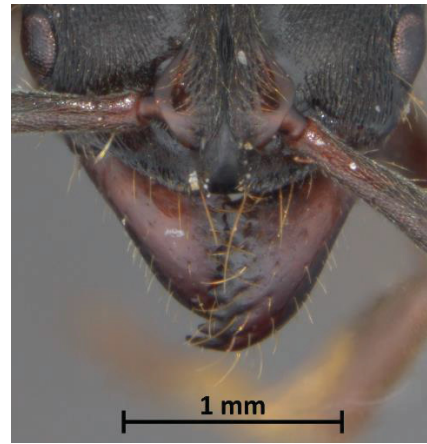


Fig. 04 – Clypeus of *P. harpax*

3.1 – Humeral angle overhanging pronotal sides (fig. 05), with or without a sharp shining carina ... 4

3.2 – Humeral angle not overhanging pronotal sides (fig. 06), with or without a sharp shining carina...5

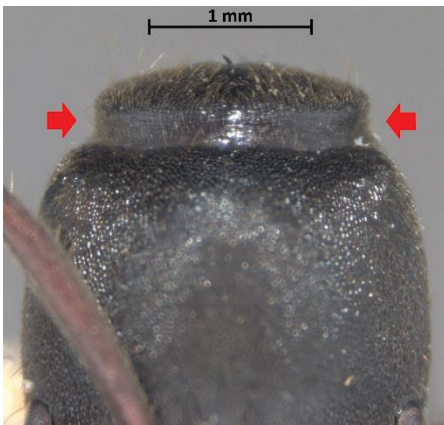


Fig. 05 – *P. fuscoatra* pronotum, frontal view



Fig. 06 – *P. impressa* pronotum, frontal view.

4.1 – Without sharp and shining carina on humeral angles (fig. 7. Arrow a); petiole in lateral view, with almost parallel anterior and posterior faces (fig. 7. Arrow b); ventral surface of head completely striate.... *P. fuscoatra*

4.2 – With sharp and shining carina on humeral angles (fig. 8. a); Petiole in lateral view with posterior margin anteriorly inclined, not parallel to anterior face (fig. 8. b); Ventral surface of head with sculpturing medially effaced *P. striata*

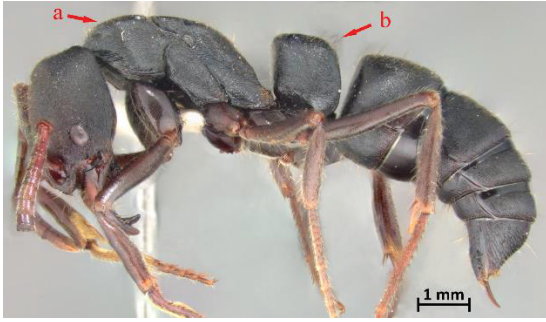


Fig. 7 – *P. fuscoatra*, lateral view

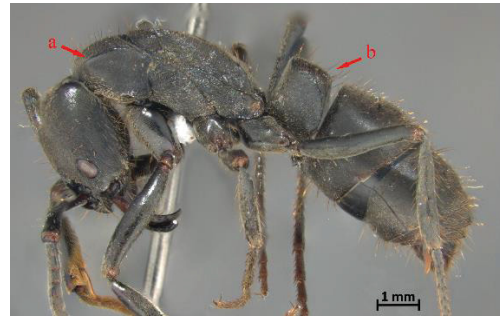


Fig. 8 – *P. striata*, lateral view

5.1 – Small species (body length $\leq 10\text{mm}$) (fig. 09); sometimes with sharp and shining humeral carina; petiole in lateral view with posterior face anteriorly curving, not parallel to anterior face; ventral surface of head with sculpturing medially effaced... 6

5.2 – Big species (body length $\geq 10\text{mm}$) (fig. 10); humeral angle never with sharp and shining carina; petiole with parallel anterior and posterior faces in lateral view; ventral surface of head completely striate... 7



Fig. 09 – *P. harpax*, lateral view



Fig. 10 – *P. impressa*, lateral view.

6.1 – Clypeus with a central longitudinal carina (fig. 11)... *P. lenis*

6.2 – Clypeus without central longitudinal carina (fig. 12)... *P. harpax*

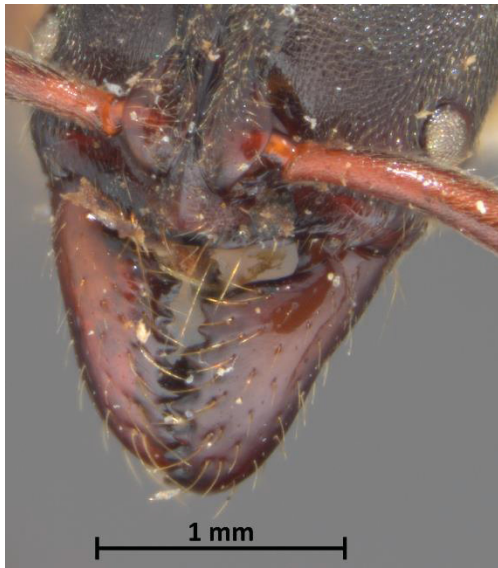


Fig. 11 – *P. lenis*, clypeal carina

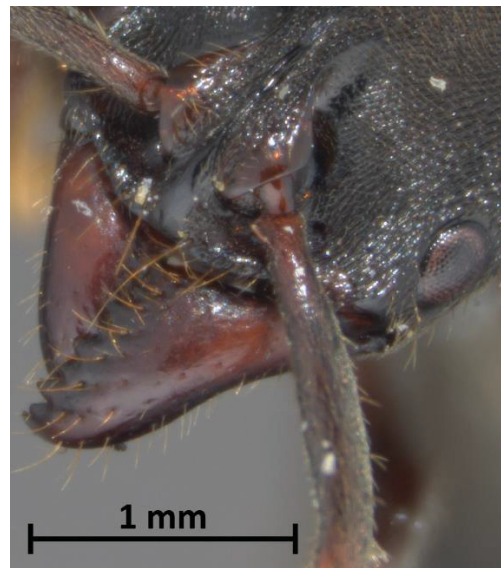


Fig. 12 – *P. harpax*, clypeus

7.1 – Short clypeus ($CD < 0.12\text{mm}$), with a strong central concavity (fig. 13); Clypeal distance shorter than antennal scape basal width ... 8

7.1 – Large clypeus ($CD > 0.12\text{mm}$), without strong central concavity. Clypeus centrally straight, slightly convex or slightly concave (fig. 14. a); Clypeal distance longer than antennal scape basal width... 9

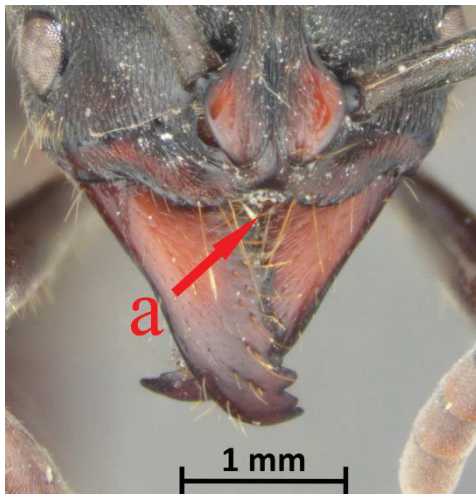


Fig. 13. – *P. impressa* clypeus

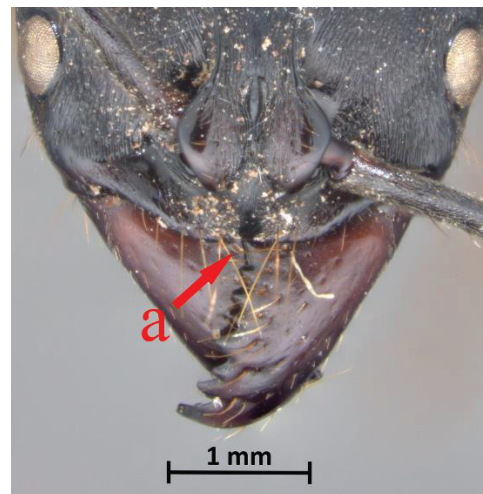


Fig. 14 – *P. purpurascens* clypeus

8.1 – Clypeus without a central carina on central concavity (fig. 15)... *P. impressa*

8.2 – Clypeus with a central carina on central concavity (fig. 16)... *P. lattkei*

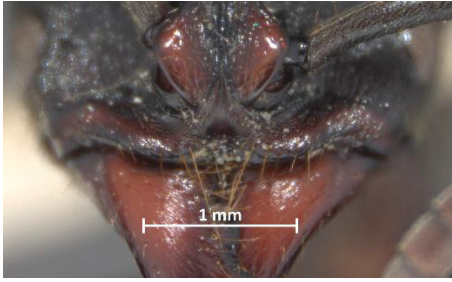


Fig. 15 – *P. impressa* clypeus

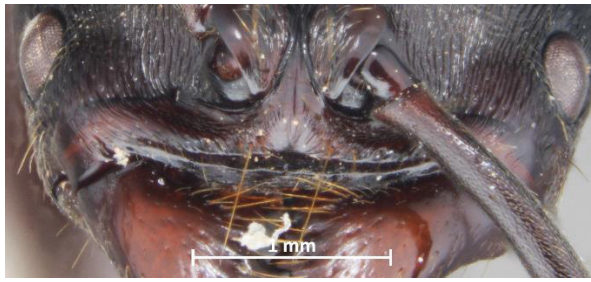


Fig. 16 – *P. lattkei* clypeus

9.1 – Dorsum of mandible striate (fig. 17)... *P. inca*

9.2 – Dorsum of mandible not striate (fig. 18)... 10

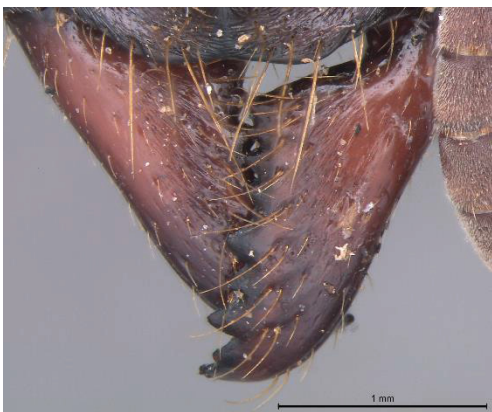


Fig. 17 – *P. inca* mandible dorsum

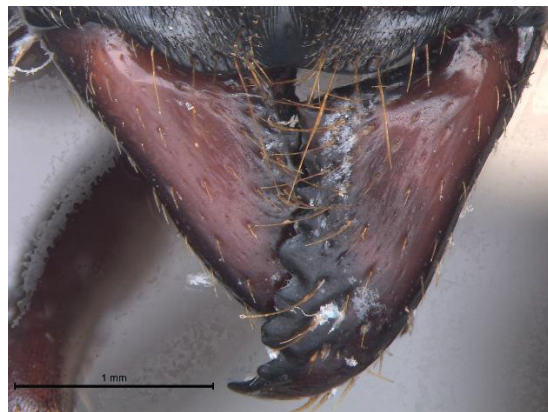


Fig. 18 – *P. purpurascens* mandible dorsum

10.1 – Frons longitudinally striate; petiole transversally striate on dorsal and posterior faces (fig. 19, 20); petiole with parallel lateral sides in posterior view (fig. 20)... *P. purpurascens*

10.2 – Frons finely striate-reticulate, becoming rolls of punctures closer to vertexal margin; petiole smooth and shining, without transversal striae on dorsal and posterior faces (fig. 21, 22); petiole broader dorsally than ventrally in posterior view (fig. 22)... *Pachycondyla* **sp. n**

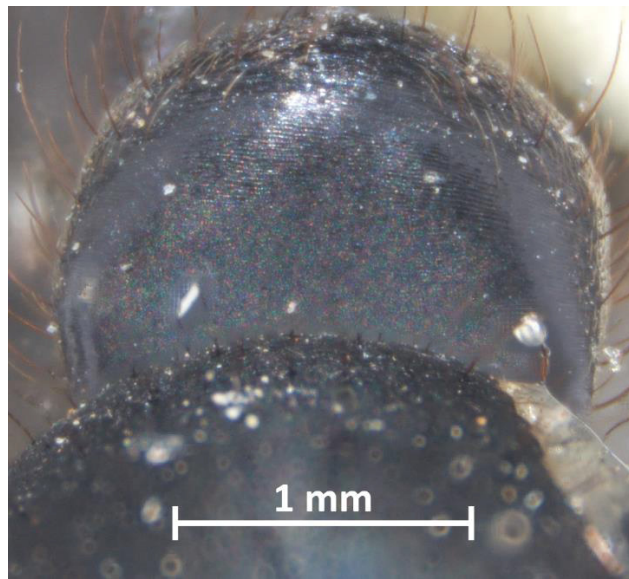


Fig. 19 – *P. purpurascens* petiolar dorsum Fig. 20 – *P. purpurascens* petiole posterior face

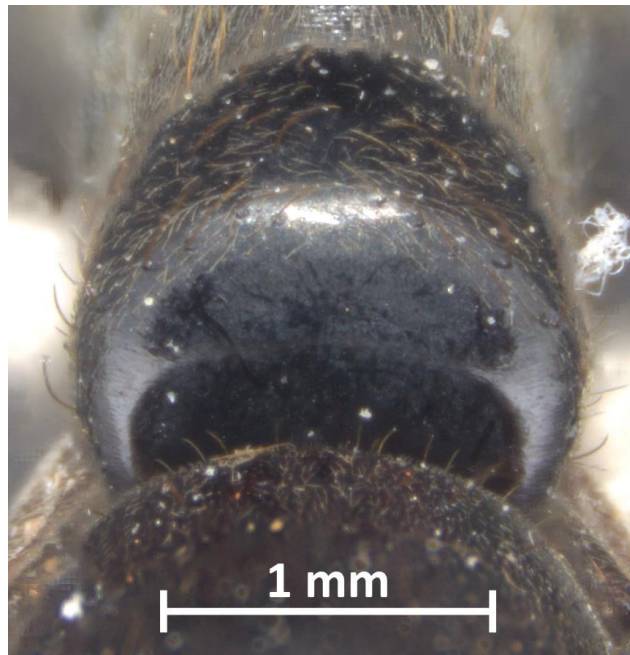
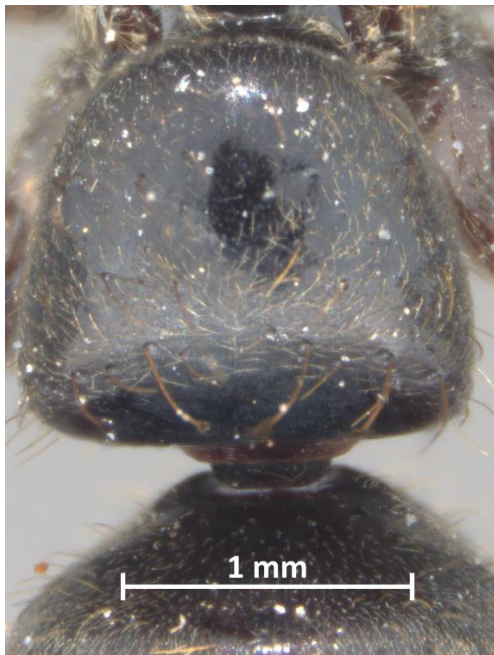


Fig. 21 – *Pachycondyla*. sp. n petiolar dorsum

Fig. 22 – *Pachycondyla*. sp. n petiole posterior face

3.4- *Pachycondyla crassinoda* (Latreille, 1802)

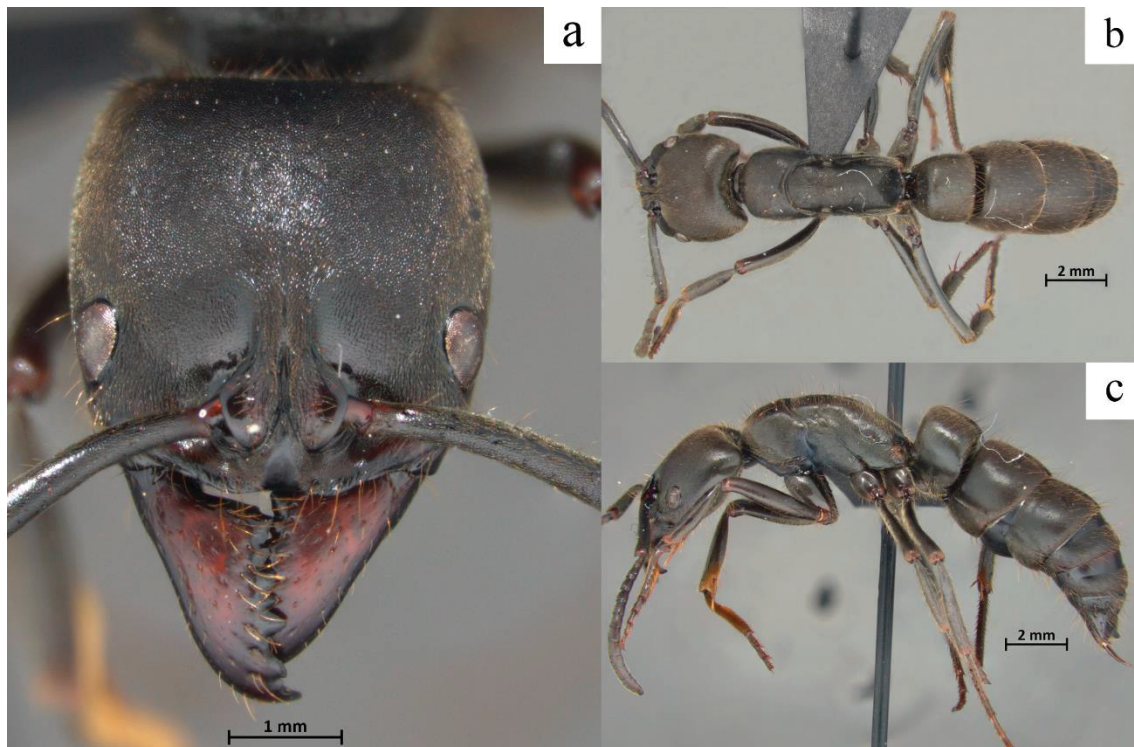


Fig 23: *Pachycondyla crassinoda* (specimen DZUP 548856). a: head in frontal view. b: body in dorsal view; c: body in lateral view.

Taxonomic history: *Formica crassinoda* Latreille, 1802: p.198. Holotype worker, FRENCH GUIANA, Cayenne (*Latreille*) (Possibly lost due to Latreille collection fragmentation (Backer, 1994)). [Combination in *Pachycondyla*: Smith, 1858: p.105.]

Worker diagnosis: This species is diagnosed by the following character:

- 1- Two tooth like posterolateral cuticular projections on the pygidium.

Worker description: Mandible with nine teeth along masticatory margin, with four intercalary lesser teeth between five major teeth; dorsum with sparse piligerous punctures, smooth at apex, base finely striate. Head subquadrate in full-face view, with weakly convex lateral margin and concave posterior cephalic margin. Clypeal anteromedian margin concave, inflexed at median process, dorsum of process flattened, smooth to finely longitudinally strigate. Dorsal malar area longitudinally striate. Frons strigulate, becoming punctate-reticulate on vertex, temple and gena. Ventral surface of head antero-centrad strigate converging to postgenal suture. Scape with piligerous punctures, reaching or surpassing vertex by one apical width when stretched posteriorly.

Mesosomal dorsal margin smoothly convex in lateral view, without abrupt curves in surface shifts nor projections. Humeral carina poorly developed or absent; pronotum

transversely strigate in dorsal view, longitudinally strigate in lateral view. Propleura with piligerous punctures. Mesonotum longitudinally strigate, dorsal propodeal face obliquely to transversely strigate. Mesopleural sulcus not visible, mesopleuron longitudinally strigate. Metapleuron anteriorly strigate, posteriorly finely strigulate.

Propodeal declivity without lateral projection, transversally strigulate anteriorly, glabrous posteriorly in dorsal view; lateral surfaces longitudinally strigate, following anterior metapleuron strigulation; dorsal margin three fourths the declivitous margin size in lateral view.

Petiolar node subquadrate, slightly longer than broad in dorsal view, anterior margin narrower than posterior margin; higher than long in lateral view, with superior portion slightly broader than inferior; finely imbricate on anterior, dorsal and lateral surfaces, glabrous on posterior surface. Subpetiolar process with anterior margin straight, postero-ventrad pointed; ventral margin weakly convex and posterior margin broadly convex in lateral view; elliptical in ventral view, with brief concavity after anterior projecting point, punctate medially and transversely striate posteriorly.

Gaster matte; anterior margin of abdominal tergite III vertical and straight in lateral view, forming right angle with dorsal margin; tergites III-IV densely punctulate, V-VI less dense, pygidium laterally longitudinally striate, anterodorsally convex, longitudinally striate; posteriorly flat to concave, smooth and shining, with two lateral tooth-like projections diverging from each other, posterior margin strongly convex above sting. Prora smaller than metatrochanter, triangular shaped with hooked posterior point; abdominal sternites III-IV densely punctulate, V-VII finely imbricate, hypopigium smoother posteriorly with scattered punctae; posterior margin with two small tooth-like semi parallel projections, separated by sting width.

Mandible with sparse hairs on dorsum and two parallel rows of decumbent hairs along masticatory margin. Clypeal discal area without hairs, anterior margin with long yellow hairs, reaching third or fourth mandibular tooth. Head pubescent with sparse suberect, anteriorly pointed hairs on dorsal and ventral surfaces.

Mesosoma finely pubescent with sparse, erect yellow hairs. Procoxa with long yellow hairs anteriorly and short hairs posteriorly. Sparse fine hairs all along profemur. Protibia with one stout setae, ventral apex and probasitarsus with dense golden pilosity; other protarsal segments with robust setae. Mid and hind legs with fine pubescence and

sparse yellow hairs on ventral side of coxae, femora and tibiae; five stout setae on mesotibia apex and four on metatibia apex. Tarsi with robust setae. Petiole dorsal and lateral faces finely pubescent with sparse erect yellow long and medium hairs; subpetiolar process with abundant whitish pubescence and yellow hairs. Gaster finely pubescent with sparse yellow long and medium hairs.

Mandible black, reddish black or red. Body black.

Measurements: Workers (n=16): HW: 3.02 – 3.75mm; HL: 3.26 – 3.92mm; CI: 90 – 97; CD: 0.16 – 0.28mm; SL: 2.85 – 3.75mm; EL: 0.61 – 0.81mm; REL: 20 – 23.25; WL: 4.51 – 5.71mm; PnW: 1.88 – 2.41mm; TL: 2.82 – 3.63mm; NW: 1.84 – 2.49mm; NL: 1.71 – 2.12mm; Pell: 107 – 131; (PPL): 2.00 – 2.53mm.

Similar species: This species differs from all other *Pachycondyla* species by having two conspicuous teeth on the pygidium. Smaller specimens may be misidentified as *Pachycondyla striata* or *Pachycondyla impressa* but, besides the pygidium, *P. striata* has a well-developed humeral carina, in contrast with *P. crassinoda* which lacks it. In addition, *P. impressa* has a similar petiolar node but the sculpturing of *P. impressa* is transversely striate, in contrast with a finely imbricate sculpturing in *P. crassinoda*.

Distribution: Occurs from Roraima (northern limit) to Rio Grande do Sul (southern limit), from Rio Grande do Norte (eastern limit) to Acre (western limit). With the exception of two records from São Paulo and Rio Grande do Sul the southern limit of this species is mid Mato Grosso and northern Goiás.

This species is typical to Amazon forest, Caatinga, northern Cerrado and northern Atlantic Forest. The altitudes on the labels of examined ants ranged from 210 to 312 meters.

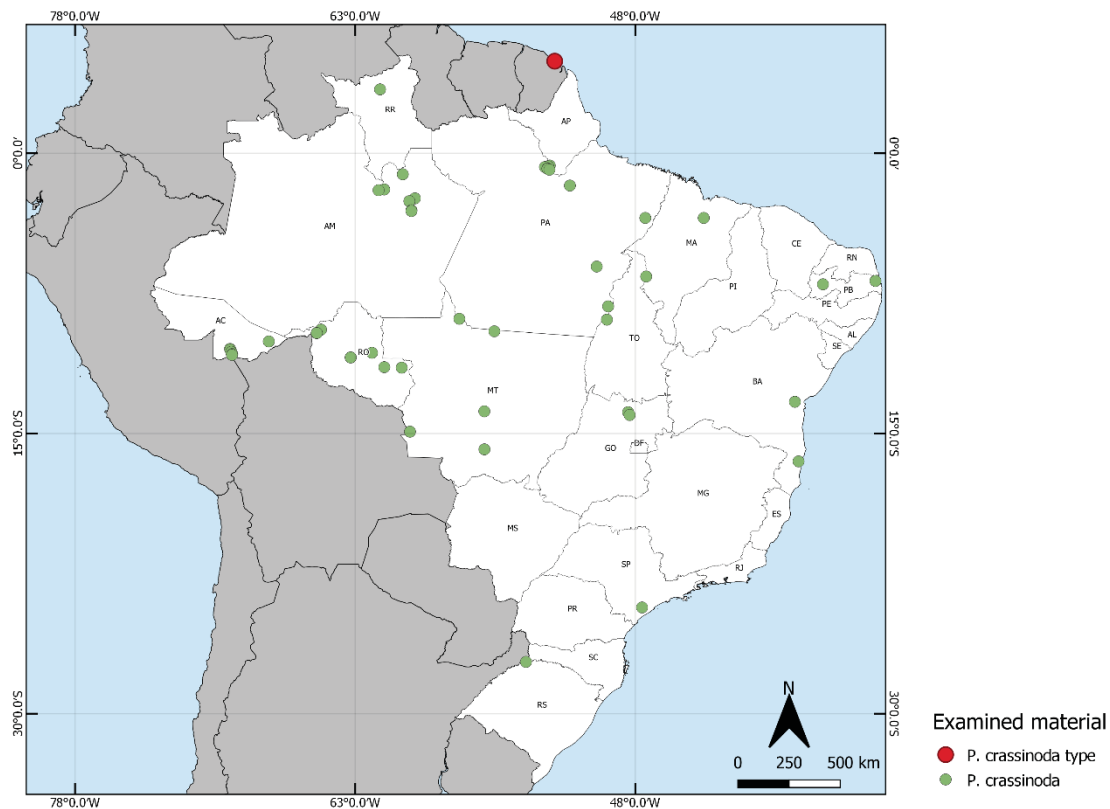


Fig 24 – Examined material distribution map and type material locality of *P. crassinoda*.

Discussion: This species is the biggest species of *Pachycondyla*, however it presents considerable size variation, the smallest specimen examined have measurements close to a large *P. striata* and the biggest with sizes close to a small *Dinoponera*. Some size variation are also observed in other species, as *P. harpax*, *P. impressa*, *P. striata*, and *Pachycondyla* sp. n. The diagnostic character of this species is apomorphic (Keller, 2011).

Two samples of this species came from São Paulo and Rio Grande do Sul. This distribution is far South from the average distribution of the species, with very different climate conditions and temperatures. Not a single specimen of *P. crassinoda* were collected in these areas since 1929 (SP record) and 2009 (RS record), considering the amounts of collections done in these areas and the lack of records of this species from there, it is unlikely that this species will be collected there again. It is also possible that these specimens are incorrectly labeled, considering these abnormal distributions, but since we were not able to confirm that, we will treat these samples as true.

Pachycondyla crassinoda nests in soil, under rotting logs or tree roots (Hanriques & Moutinho, 1994 *apud* Tudor et al, 2016). They are more active when the ground is drier, foraging under fallen leaves and hide if disturbed. They prefers live or freshly killed

arthropods one fraction of its own size, sometimes it can take vegetable matter too. Tends not to sting its prey leaving the sting for colony and self-defenses. (Tudor et al, 2016). Ergatoid females occur in this species.

Examined material: n = 150: BRAZIL: **Acre:** 2 workers, Assis, Brasil: RESEX Chico Mendes, 10°28'39.80"S 69°42'11.90"W, 06.vi.2017, (Costa M. M. S) [UFAC]; 1 worker, Assis, Brasil: RESEX Chico Mendes, 10°31'29.85"S 69°41'00.09"W, 06.vi.2017, (Costa M. M. S) [UFAC]; 1 worker, Assis, Brasil: RESEX Chico Mendes, 10°38'13.70"S 69°38'04.60"W, 24.v.2017, (Costa M. M. S) [UFAC]; 1 worker, Assis, Brasil: RESEX Chico Mendes, 10°39'59,10"S 69°36'25.70"W, 28.v.2017, (Costa M. M. S) [UFAC]; 1 worker, Assis, Brasil: RESEX Chico Mendes, 10°45'18.8"S 69°35'10.9"W, 20.v.2017, (Costa M. M. S) [UFAC]; workers, Assis, Brasil: RESEX Chico Mendes, 10°47'52.90"S 69°35'56.5"W, 19.v.2017, (Costa M. M. S) [UFAC]; 1 worker, Rio Branco, Faz. Exp. Catuaba – UFAC, -10.0778° -67.62.6264°, 07.xi.2016, (Lattke, J.) [DZUP]; 1 worker, Senador Guimard, Fazenda Experimental Catuaba, 10°04'40"S 67°37'35"W, 07.xi.2016, (Grupo 1 - Formigas do Brasil) [DZUP]; 3 workers, Senador Guimard, F. E. Catuaba, 10°04'40"S 67°37'35"W, 25.v.2015, (Oliveira et al.) [UFAC]. **Amazonas:** 1 worker, Capoeira Grande, PNJ. R. Jaú, 1°56'28"S 61°26'46"W, 25-28.vii.1995, (A. Santos) [INPA]; 1 worker, Capoeira Grande, PNJ. R. Jaú, 1°56'28"S 61°26'46"W, 25-28.vii.1995, (A. Santos) [INPA]; 1 worker, Capoeira Grande, PNJ. R. Jaú, 1°56'28"S 61°26'46"W, 25-28.vii.1995, (A. Santos) [INPA]; 1 worker, Manaus, [2°25'S] [59°48'W], 30.ix.93, (A. B. Casimiro) [INPA]; 2 worker, Manaus, [2°25'S] [59°48'W], vii.1962, (Oliveira, F. M. O) [DZUP]; 1 worker, Manaus, Reserva Caueiras, [2°34'S] [60°06'W], 30.III.2005, (F. B. Baccaro) [INPA]; 1 worker, Manaus, Faz. Porto Alegre, [3°03'16.6"S] [59°59'04.6"W], 15.v.1996, (H. Vasconcelos) [INPA]; 1 gyne, Manaus, INPA, [3°05'40.4"S] [59°59'21.3"W], 19.v.1976, (without collector) [INPA]; 1 gyne, Manaus, INPA, [3°05'40.4"S] [59°59'21.3"W], 13.iii.1988, (Jose Camilo Furtado) [INPA]; 1 gyne, Manaus, INPA, [3°05'40.4"S] [59°59'21.3"W], 14.v.1976, (E. Rufino) [INPA]; 1 worker, Novo Ayrão, PNJ. R. Carabinai, 1°59'S 61°45'W, 25 - 30.vi.1994, (A. Santos) [INPA]; 1 worker, Novo Ayrão, PNJ. Castanho, 1°97'S 61°45'W, 18-28.x.1993, (C. Motta) [INPA]; 1 worker, Pres. Figueiredo, IG. Poraque, 1°54'57"S 59°26'94"W, 19.viii.1993, (without collector) [INPA]; 1 worker, Reserva Campinha, [1°07'40.7"S] [60°27'01.5"W], 18.i.1978, (A. Soares) [INPA]. **Bahia:** 1 worker, Mascote, 15334.9S 0391834W, 18.vi.1999, (Santos, J. R. M) [DZUP]; 1 worker, Porto Seguro, Parna do Pau Brasil,

[16°29'54.2"S] [39°15'20.8"W], v.2015, (T. Vargas) [UFV]; 3 worker, Uruluca, Serra Grande, [13°18'41.6"S] [39°26'58.3"W], 25.viii.1992, (C. N. Ivan) [INPA]. **Goiás:** 1 worker, Araguacema, [8°54'39.4"S] [49°31'08.5"W], 28.i.1983, (Nonato) [INPA]; 18 workers, Campinaçu, Serra da Mesa, 13°52'S 48°23'W, 18.ii-2.iii.1996, (Silvestre, Brandão & Yamamoto) [MZSP]; 1 gyne, Campinaçu, Serra da Mesa, 13°52'S, 48°23'W, 18.ii-2.iii.1996, (Silvestre, Brandão & Yamamoto) [MZSP]; 2 workers, Colinas do Sul, Serra da Mesa, 14°01'S 48°12'W, 2-15.xii.1995, (Silvestre, Dietz & Campaner) [MZSP]; 18 workers, Niquelândia, 14°01'S 48°18'W, 24.ix-6.x.1995, (Silvestre, Dietz & Brandão) [MZSP]. **Maranhão:** 2 workers, Estreito, Fazenda Planalto, 06°35'59.3"S 47°24'50.4"W, 12-22.vi.2006, (Silva, R. R. & Feitosa, R. M.) [MZSP]; 1 worker, Itapecuru-Mirim, 03°28'S 44°20'W, ii.2010, (Leandro) [DZUP]. **Mato Grosso:** 1 worker, Nova Mutum, Fazenda Buriti, [13°49'03.6"S] [56°05'01.5"W], 09.vii.1997, (Ribeiro, G. C & Mendes, H. F.) [DZUP]; 8 worker, Novo Mundo, P. E. Cristalino (PPBio), [9°32'01.9"S] [55°32'56.8"W], v.2013, (Vicente, R. E.) [DZUP]; 1 worker, Sto. A. do Levensger, Morro Mata, [15°51'13.0"S] [56°04'35.8"W], 31.viii.1981, (M. P. Duarte) [INPA]; 1 worker, Vila Bela da Santíssima Tindade, Serra Ricardo Franco, 14°54'27.5"S 60°03'52"W, 07.ii.2014, (Maravalhas, J. et al) [DZUP]. **Pará:** 1 worker, Conceição, Araguaia, [8°11'53.1"S] [49°27'05.6"W], vii.1959, (Alvaranga, M.) [DZUP]; 1 worker, Gurupá, 1.204°S 51.818°W, 18.x.2003, (J. M. S. Vihena) [INPA]; 1 hergatóide, Jari, Amazônia, 0°53'S 52°36'W, 2011, (Silva, E. A.) [DZUP]; 15 worker, Jari, Amazônia, 00°53'S 52°36'W, 2011, (Silva, E. A.) [DZUP]; 1 worker, Melgaço, Caxuanã, Estação Científica Ferreira Penna, 1°44'S 51°30'W, 27.x.2003, (J. Souza & C. Moura) [INPA]; 1 worker, Monte Dourado, 0°49.42284"S 52°41.44600"W, 10-12.v.2011, (Marsh, C. J.) [DZUP]; 1 worker, Monte Dourado, 0°42.75440'S 52°41.51534'W, 07-09.v.2011, (Marsh, C. J.) [MZSP]; 1 worker, Monte Dourado, 0°44.265924'S 52°50.15141'W, 07-09.v.2011, (Marsh, C. J.) [MZSP]; 1 worker, Monte Dourado, 0°42.18389'S, 52°39.54253'W, 07-09.v.2011, (Marsh, C. J.) [MZSP]; 1 worker, Monte Dourado, 0°49.42888'S 52°41.49246'W, 07-09.v.2011, (Marsh, C. J.) [MZSP]; 1 worker, Monte Dourado, 0°49.26656'S 52°41.58766'W, 07-09.v.2011, (Marsh, C. J.) [MZSP]; 1 worker, Monte Dourado, 0°44.08271'S 52°50.00250'W, 07-09.v.2011, (Marsh, C. J.) [MZSP]; 1 worker, Monte Dourado, 0°39.43555'S 52°34.43730'W, 07-09.v.2011, (Marsh, C. J.) [MZSP]; 1 worker, Paragominas, Rede Amazônia Sustentável, UTM X 226174.31 UTM Y 9616513.38, 1.vii.2011, (Solar, R. et al.) [UFV]; 1 worker, Parauapebas, Flona de Carajás, 589.734.045 9.328.709.001, 21.ii.2010, (A. A. Matias) [INPA]; 1 worker,

Parauapebas, Flona de Carajás, 589.734.045 9.328.709.001, 21.ii.2010, (A. A. Matias) [INPA]; 1 worker, Rio Teles Pires, 08°51'54"S 57°25'25"W, 24.vi.2009, (Albertoni, F. F.) [DZUP]; 5 workers, S. Norte, Carajás, [6°04'10.3"S] [50°03'59.7"W], vii-viii.1985, (Brandão & Benson) [MZSP]. **Paraíba:** 1 gyne, Corema, [7°01'03.5"S] [37°56'48.4"W], vi.1957, (Exp. Dep. Zoologia) [MZSP]; 1 worker, Mamanguape, [6°50'19.8"S] [35°08'11.9"W], vii.1957, (Exp. Dep. Zoologia) [MZSP]. **Rondônia:** 2 workers, Cacaolândia, Rio Jamari, 10°56'05.36"S 63°14'25.95"W, 24.v.2012, (Savaris, M.) [DZUP]; 1 worker, Cacoal, Área de Mara, 11°27'14.0"S 61°26'30.1"W, vii.2013, (Silva, L.S) [DZUP]; 4 workers, Espigão do Oeste, Sítio Dois Irmãos, 11°28'59.3"S 60°30'28.7"W, iii.2013, (Santana, B. R.) [DZUP]; 3 workers, O. Preto Oeste, Cach. Rio Mandl, [10°41'15.1"S] [62°05'57.7"W], 7-11.vii.1995, (A. Santos) [INPA]; 1 worker, Ponto Velho, Área Caiçara, 09°26'41"S 64°49'39"W, 02-16.x.2013, (Mazão G. R. & Mendonça, R. T. T.) [DZUP]; 1 worker, Porto Velho, Área Mutum, 09°37'42"S 65°03'35"W, 02-16.x.2013, (Mazão, G. R. & Mendonça, R. T. T) [DZUP]; 1 worker, Porto Velho, Área Mutum, 09°37'42.9"S 65°03'27.8"W, 04-18.ix.2012, (Vicente, RE & Oliveira, J.) [DZUP]; 1 worker, SE de Vilhena, 12.850°S 60.050°W, 14.viii.2012, (Cavichioli, Melo, Rosa & Santos) [DZUP]. **Rondônia:** 1 worker, Rolim de Moura, Área Mata, -11.569964 -61.760266, 08.x.2015, (Silva, E. A.) [UFV]. **Roraima:** 5 workers, I. Maracá, picada alojamen., [3°25'00.2"N] [61°40'00.0"W], 22-28.ix.1987, (Brandão & Cancelli) [MZSP]. **Rio Grande do Sul:** 1 worker, Derrubadas, Parque Estadual do Turvo, [27°13'57.4"S] [53°51'04.8"W], 25.iv.2009, (T. Marques) [UFV]. **São Paulo:** 1 worker, Brasil, São Paulo (SP), Juquiá, [24°19'04.1"S] [47°38'03.4"W], xi.1929, (J. Lane) [MZSP].

3.5- *Pachycondyla fuscoatra* (Rogers, 1861).

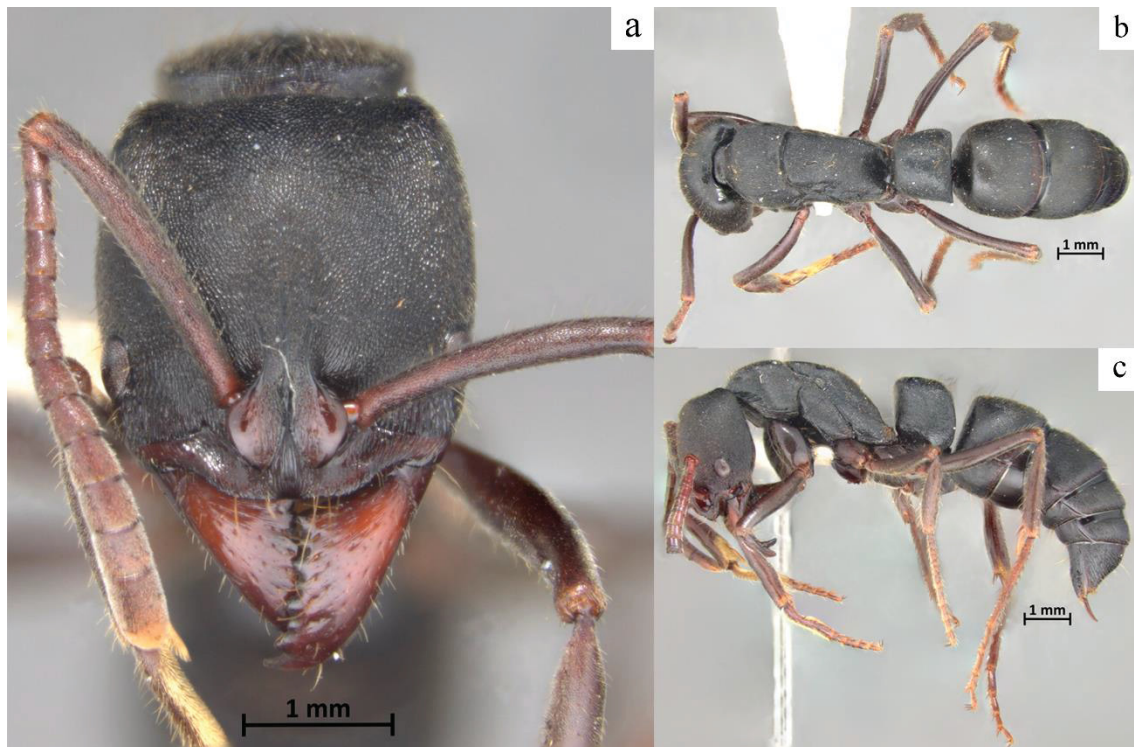


Fig 25: *Pachycondyla fuscoatra* (DZUP 548857). a: head in frontal view. b: full body in dorsal view; c: full body in lateral view.

Taxonomic history: *Ponera* (*Pachycondyla*) *fuscoatra* Roger, 1861: p. 8. Syntype workers, COLOMBIA: no accurate locality given; VENEZUELA: Puerto Cabello (misspelled as Caballo) (Roger) (Possibly destroyed during World War II (MacKay & MacKay, 2010).) [Combination in *Pachycondyla*: Mayr, 1863: p.439.]

Worker diagnosis: The following suite of characters diagnose this species:

- 1- Frons coarsely striate.
- 2- Humeral angle slightly overhanging pronotal side.
- 3- Humeral carina not developed.
- 4- Petiole with parallel anterior and posterior margins.
- 5- Gaster matte.

Worker description: Mandible triangular in dorsal view with nine teeth along masticatory margin, four smaller intercalary teeth present between five larger teeth; dorsum strigate, striae spreading from base to masticatory margin. Head subquadrate in full-face view, with convex lateral margin and weakly concave posterior cephalic margin. Clypeal anteromedian margin convex, medially concave to transverse, median clypeal area longitudinally elevated, extending posterad between frontal lobes, finely

longitudinally striate. Dorsal malar area longitudinally striate. Frons strigate-rugose, longitudinal medially and posteriorly diverging laterally. Ventral surface of head with posterolaterally diverging costulae. Scape reaching or barely surpassing vertex when stretched posteriorly, densely piligerous punctulate.

Mesosomal dorsal margin smoothly convex in lateral view, propodeal declivitous margin straight, weakly convex posterior to propodeal spiracle. Humeral carina not developed, but humeral angle developed, slightly overhanging pronotal sides in dorsal view. Anterior pronotal face with partially effaced striae, smooth towards anterior margin, pronotal dorsum anteriorly with transverse striae that curve posteriorly on sides forming U-shaped pattern, lateral pronotal surface longitudinally striate. Propleuron shining with piligerous punctulae. Mesonotum longitudinally striate in dorsal view, striae becoming finer on propodeal dorsal face and curving close to declivity. Mesopleural sulcus poorly developed to absent; mesometapleuron and lateral propodeal face continuously longitudinally striate. Propodeal declivitous margin forming blunt obtuse angle with dorsal margin, lateral margins in full-face view slightly diverging posteriorly; transversally strigate anteriorly, tending to smooth and shining posteromedially; length of dorsal margin in lateral view three-fourths that of declivitous margin.

Petiolar node subquadrate in dorsal view, anterior margin broadly convex, slightly narrower than posterior margin; higher than long in lateral view; anterior margin straight slightly anteriorly inclined, posterior margin parallel to anterior margin, weakly convex posteroventrally; anterior surface imbricate to weakly transversely striate, dorsal and lateral surfaces transversely striate, posterior surface transversely striate to posterolaterally weakly imbricate to smooth. Subpetiolar process roughly trapezoid, anterior margin with a minor concavity before straight oblique margin, forming a postero-ventrad projection where anterior and ventral margins meet; ventral and posterior margins swollen forming a round angle on its intersection, ventrally transversely striate.

Gaster shining; anterior margin of abdominal tergite III vertical and straight in lateral view, forming right angle with dorsal margin; Abdominal tergite III anteriorly transversely finely striate, posteriorly and tergite IV longitudinally finely striate, tergites V-VI with stronger longitudinal striae; Pygidium transversely strongly striate anteriorly and longitudinally strongly striate laterally, dorsoposteriorly mostly smooth and shining, slightly flattened to concave medially. Prora small, smaller than metatrochanter, triangular shaped with hooked posterior point, sternite III with fine piligerous punctulae,

IV densely punctate, V-VI anteriorly almost smooth and shining and posterolaterally punctate, hypopigium anteriorly smooth and shining, medioposteriorly punctate, posterior margin weakly concave.

Mandible with sparse hairs on dorsum and two parallel rows of decumbent hairs along masticatory margin. Clypeal medial area without hairs, anterior margin with long yellow setae, reaching third or fourth mandibular tooth. Head with appressed and decumbent pubescence, with sparse erect hairs on dorsal and ventral surfaces. Pubescence sparse on ventral head surface.

Mesosoma sparsely pubescent, with sparse erect yellow hairs. Procoxa pubescent with long erect yellow hairs anteriorly and short erect hairs posteriorly; profemur dorsum without hairs and sparse suberect hairs ventrally. Protibia with one stout apical seta, ventral apex and probasitarsus with dense golden appressed pilosity; other protarsal segments with robust setae ventrally. Mid and hind legs with fine pubescence and sparse suberect yellow hairs on ventral side of coxae, femora and tibiae; four to six stout setae on mesotibial apex and three to five on metatibial apex. Tarsi with robust setae. Petiole and gaster finely pubescent with sparse erect and suberect yellow long and medium hairs.

Mandible reddish black or ferruginous. Antennae reddish black to ferruginous. Body black. Legs black or reddish black.

Measurements: Workers (n = 12): HW: 2.41 – 2.65mm; HL: 2.65 – 2.90mm; CI: 87 – 95; CD: 0.12 – 0.20mm; SL: 2.41 – 2.57mm; EL: 0.49 – 0.53mm; REL: 18.46 – 21.31; WL: 3.81 – 4.25mm; PnW: 1.67 – 1.88mm; TL: 2.08 – 2.33mm; NW: 1.59 – 1.75mm; NL: 1.26 – 1.43mm; Pell: 114 – 129; PPL: 1.59 – 1.88mm.

Similar species: This species is very similar to *P. striata* and *P. impressa*. When compared with MacKay's description of *P. impressa* and using his species identification key, specimens of *P. fuscoatra* are also identifiable as *P. impressa*. Examining high resolution images of the types of *P. impressa* available on AntWeb ([FOCOL0951](#), photography by Christiana Klingenberg; [FOCOL0952](#), photography by Christiana Klingenberg; [FOCOL0953](#), photography by Christiana Klingenberg) and comparing to specimens of *P. fuscoatra* it becomes clear how these two species differ one from another.

In *P. impressa* the clypeus is short ($CL < \text{Antenal scape width}$) with a strong median concavity in the anterior margin, while in *P. fuscoatra* it is almost straight. The humeral angle of *P. impressa* is not swollen or elevated, but rounds continuous onto the lateral pronotal face, while in *P. fuscoatra* it is elevated and developed into a blunt longitudinal ridge but does not form a carina. Both species present tooth-like metasternal processes and costulae on the sides of the pygidium, features formerly considered to be diagnostic for *P. impressa* (Kempf, 1972; MacKay & MacKay, 2010).

P. fuscoatra does not present a humeral carina, while it is strongly developed and easily visible in *P. striata*. The petiole of *P. fuscoatra* is longer (Pell 114 - 129) than *P. striata* (Pell 122 - 153), with a not so anteriorly curved posterior face. The gastral sculpturing of *P. fuscoatra* is longitudinally strigulate, differing from the matte or sometimes shining punctulate integument of *P. striata*.

Distribution: Occurs from Minas Gerais (southern and eastern limits) to north Pará (northern limit) and Acre (western limit). This species is typical of the northern states of Brazil. It inhabits Amazon Forest, northern Caatinga, northern Cerrado and northern Atlantic Forest in altitudes that range from 214m to 650m.

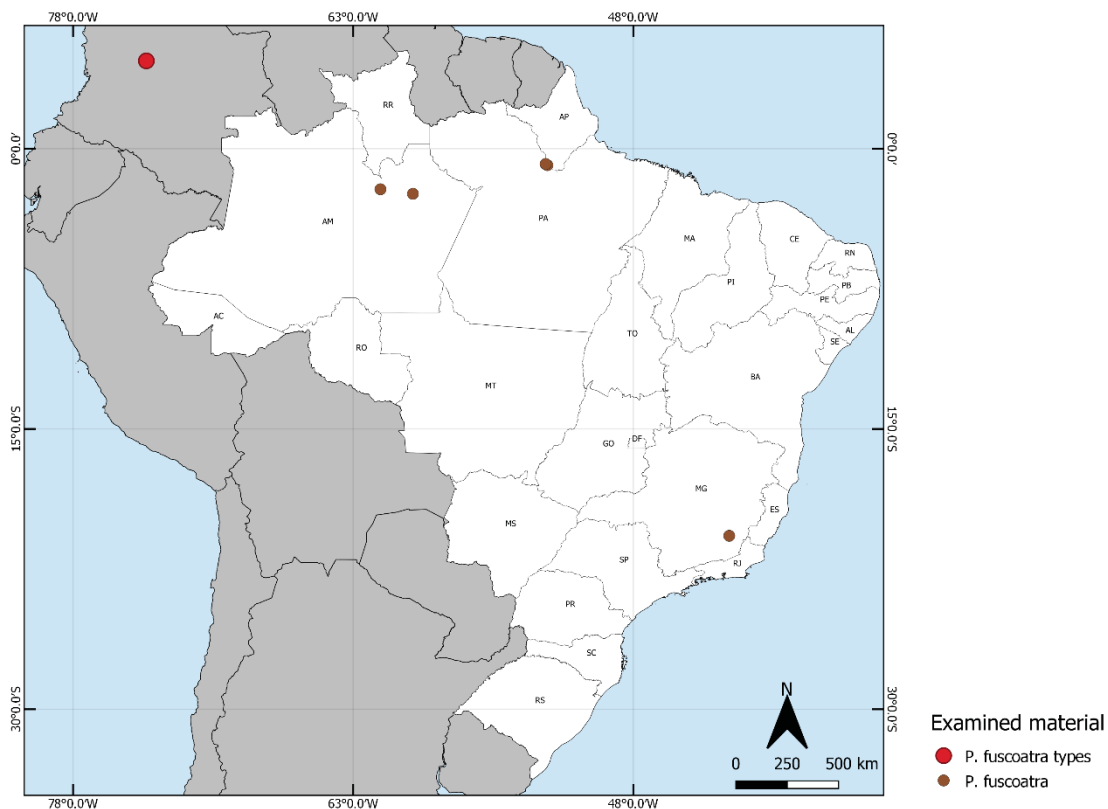


Fig 26- Examined material distribution map and type material locality of *P. fuscoatra*.

Discussion: There is an enormous confusion about this species identity, on its original description Roger (1861) considered it very similar to *P. impressa* but provides a number of characters to distinguish between the two species. Emery (Emery, 1890 *apud* Kempf, 1961) distinguish them based on integument brightness which “is of reduced sistematic value” using Kempf’s words, which are proven true when we examine brightness in the *P. striata* gaster, which varies from matte to shining. Kempf (1961, p. 195) comments *P. fuscoatra* as having 5-6 teeth contrasting with 8-9 teeth in *P. impressa*, but in the original description Roger reports 8 to 9 teeth in *P. fuscoatra*. MacKay & MacKay (2010) comment on *P. fuscoatra* having 5 teeth if one ignores 4 intercalary lesser teeth, leaving *P. fuscoatra* with 9 teeth. Both Emery and Kempf ignore the most distinguishing feature in *P. fuscoatra* from *P. impressa*, which is the humeral angle that overhangs the pronotal sides in dorsal view or dorsum of pronotum expanding after a constriction in front view. This feature is mentioned in the original description as the pronotum being slightly compressed. A compression on pronotum sides is only observable in *Pachycondyla* when the humeral angle is developed and overhangs pronotal sides. This is not cited by Roger as being a differential feature from *P. impressa*.

We found a sample from Colombia, deposited in MZSP that was determined as *P. fuscoatra* by Santschi and afterwards by Borgmeier. This sample is readily identifiable as a specimen of the *impressa* species group (see [Genus Pachycondyla](#)) and has humeral angles developed into blunt longitudinal ridges, with pronotal constrictions as mentioned on the original description of *P. fuscoatra*. This feature is only observable in *P. fuscoatra* within this species group. Considering this feature, we follow and support the determination of this specimen as *P. fuscoatra*. It is a specimen distinguishable from *P. impressa*, as the same sample is identified and mentioned as *P. impressa* in Kempf’s work.

Pachycondyla fuscoatra has lateral costulae on the pygidium but shares this feature with all species of *impressa* species group, reducing its taxonomic value and being important for understanding the multiple synonymies and taxonomic confusion (see [P. impressa](#) discussion).

This species is previously recorded from Brazil only in Pará (Forel, 1907; Kempf 1972) and is a sample from Óbidos mentioned by Kempf in his revision of the genus.

Examined material: n= 16: BRAZIL: **Amazônas:** 1 worker, Manaus, EMBRAPA, 2.898°S 59.991°W, vi.2003, (C. Rabeling) [MEPN]; 6 workers, Manaus, ZF3, 2°25'S 59°48'W, 20.ix.1996, (A. C. Macedo et al.) [INPA]; 1 worker, PNJ, Cachoeira Gavião, 2°10'20"S 61°32'22"W, Pitfall, 29.vii-1.viii.1995, (A. Santos) [INPA]. **Minas Gerais:** 1 worker, Viçosa, Mata do Chaves II, 20°43'28.0"S 42°51'35.6"W, Pitfall, 02.ii.2007, (Schmidt et al.) [UFAC]. **Pará:** 1 worker, Jari, Amazônia, 0°53'S 52°36'W, Corte seletivo, 2011, (Silva, E. A.) [DZUP]; 2 worker, Monte Dourado, 0°49.42888'S 52°41.49246W, 10-12.v.2011, (Marsh, C. J.) [DZUP]; 1 worker, Monte Dourado, 0°49.28007'S 52°41.57580W, 16-18.xi.2010, (Marsh, C. J.) [DZUP]; 1 worker, Paragominas, Rede Amazônia Sustentável, UTM X 236786.58 UTM Y 9642467.88, UFV LABECOL n° 000353, 1.vii.2011, (Solar, R. et al.) [UFV]; COLOMBIA: 1 worker, Colombia, [4°42'01.1"N] [74°04'28.9"W], (without collector), (without date) [MZSP].

3.6- *Pachycondyla harpax* (Fabricius, 1804)

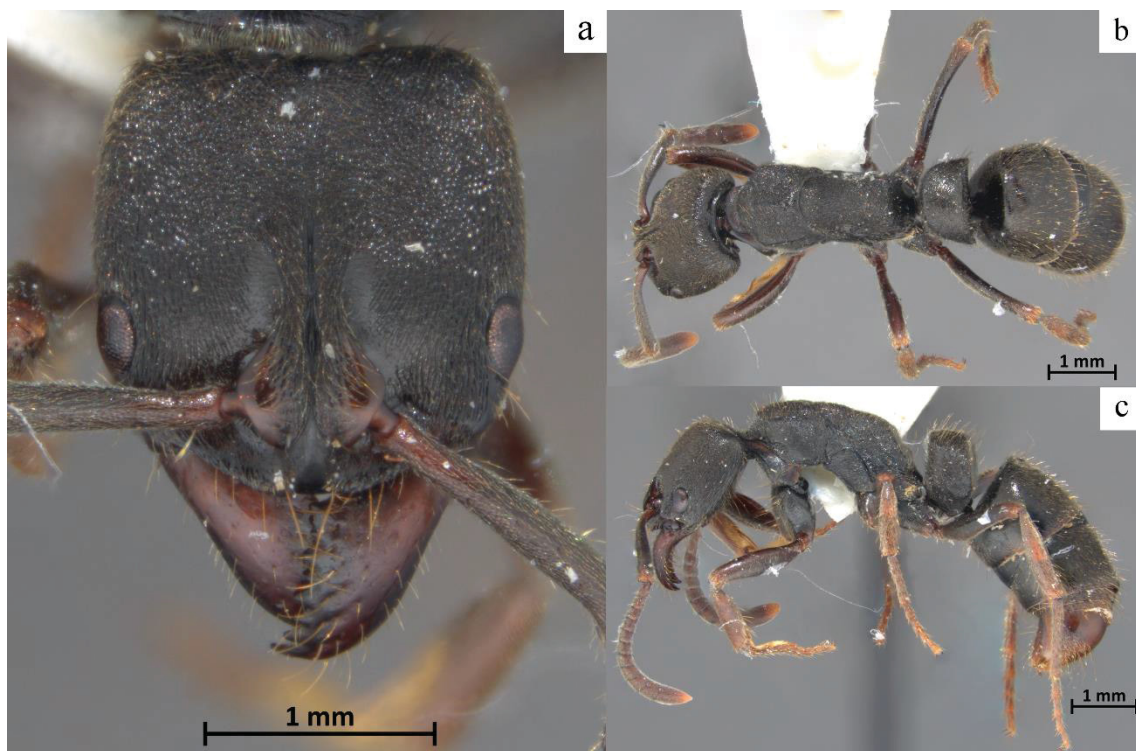


Fig 27: *Pachycondyla harpax* (DZUP 548858). a: head in frontal view. b: full body in dorsal view; c: Full body in lateral view.

Taxonomic history: *Formica harpax* Fabricius, 1804: p. 401. Two syntype workers, South America, NEOTROPIC, no accurate locality given (Fabricius) [NHMD]. [Combination in *Pachycondyla*: Roger, 1863: p.18]

Pachycondyla montezumia Smith, 1858: p.108. Syntype gyne, MEXICO, no accurate locality given (without collector) [BMNH]. [high resolution images examined ([CASENT0902516](#), photography by Will Ericson)] [Junior synonym of *harpax*: Brown, 1950g: p.247]

Pachycondyla dibullana Forel, 1901: p.347. Lectotype worker, COLOMBIA, Dibulla, La Guajira, Lat. 11.272506 Long. -73.309105 (Forel) [MHNG]. [high resolution images examined ([CASENT0907250](#), photography by Will Ericson)] [Junior synonym of *harpax*: Brown, 1950: p.247]

Pachycondyla harpax concina Wheeler, 1925: p.5. Syntype workers, BRAZIL, Rio Madeira Abuna (*Mann & Backer*) [MCZ] [high resolution images examined ([MCZT20438](#))] [Junior synonym of *harpax*: Brown, 1950: p.247]

Pachycondyla harpax irina Wheeler, 1925: p.5. Syntype workers, GUATEMALA, Quirigua, 13.i.1912. (*W. M. Wheeler*) [MCZ] [high resolution images examined ([MCZT20439](#))] [Junior synonym of *harpax*: Brown, 1950: p.247]

Worker diagnosis: The following suite of characters diagnoses this species:

- 1- Small body size (< 10 mm).
- 2- Humeral angle without integument overhanging pronotal side.
- 3- Humeral angle generally with shining sharp carina.
- 4- Clypeus without central longitudinal carina.

Worker description: Mandible triangular in dorsal view with nine to ten teeth along masticatory margin, four smaller intercalary teeth present between five to six larger teeth; dorsum shining with sparse piligerous punctures. Head subquadrate in full-face view, with weakly convex lateral margin and weakly concave posterior cephalic margin. Clypeal anteromedian margin convex, medially transverse or slightly concave, median clypeal area longitudinally elevated, extending posterad between frontal lobes, smooth and shining. Dorsal malar area longitudinally striate. Frons weakly to strongly striate, longitudinal on center and posteriorly diverging, gena longitudinally striate. Gena in lateral view with punctures or weak strigulae to strong and shining longitudinal striae. Ventral surface of head with posterolaterally diverging striae, striae variously effaced medially. Scape with piligerous punctulae, apex reaching or surpassing vertex by less than one apical width when stretched posteriorly.

Mesosomal dorsal margin weakly convex in lateral view, almost straight; propodeal declivitous margin straight, broadly convex slightly posterior to propodeal spiracle. Humeral carina poorly developed to well developed, smooth and shining, not overhanging pronotal side, pronotal lateral face convex; pronotal anterior face transversely weakly striate to almost imbricate; pronotal dorsum anteriorly with transverse fine striae that curve posteriorly on sides forming U-shaped pattern, center smooth and shining or longitudinally striate, lateral pronotal surface longitudinally substrigulate or striate. Propleuron transversally striate to shining with piligerous punctures. Mesonotum longitudinally striate in dorsal view. Mesopleural sulcus well-developed; anepisternum longitudinally striate, katepisternum varies from longitudinally striate to smooth and shining with piligerous punctulae. Metapleuron continuous with katepisternum sculpturing orientation. Lateral propodeal face longitudinally striate.

Propodeal declivity laterally bound by low, broadly convex crest; anteriorly transversely strigate, medially imbricate and posteriorly tending to smooth and shining with piligerous punctures; length of dorsal margin in lateral view about same as declivitous margin.

Petiolar node subtrapezoid in dorsal view, anterior margin convex, narrower than posterior margin; higher than long in lateral view; anterior margin straight, dorsal margin straight to weakly convex and posterior margin broadly convex. Anterior surface smooth and shining with punctulae, dorsal surface anteriorly with weakly developed transverse substrigulae that curves posteriorly on sides forming U-shaped pattern, shining with punctulae on center, lateral surfaces mostly shining, with punctulae, sometimes with sign of weak striae.

Subpetiolar process roughly trapezoid to subtriangular in lateral view, anterior margin with a minor concavity before straight oblique margin, forming a postero-ventral projection where anterior and ventral margins meet; ventral and posterior margins swollen forming rounded angle; ventrally anteriorly glabrous, transversely costate.

Gaster usually shining; anterior margin of abdominal tergite III vertical and straight in lateral view, forming right, sometimes slightly acute angle with dorsal margin; abdominal tergites III-IV densely finely punctate, V-VI with bigger and sparser punctures; pygidium with abundant shallow punctulae laterally, dorsally mostly smooth and shining, slightly flattened medially. Prora small, smaller than metatrochanter, with

great variation among specimens; abdominal sternites III-IV finely punctate, V-VI anteriorly imbricate lateroposteriorly punctate; hypopigium with sparse shallow punctures, posterior margin broadly convex.

Mandible with sparse hairs on dorsum and two parallel rows of decumbent hairs along masticatory margin. Clypeal medial area without hairs, anterior margin with long yellow setae, reaching third or fourth mandibular tooth. Head with or without appressed and decumbent pubescence, with sparse erect hairs on dorsal and ventral surfaces. Pubescence almost absent anteromedially on ventral head surface.

Mesosoma sparsely pubescent, with sparse erect yellow hairs. Procoxa pubescent with long erect yellow hairs anteriorly and short erect hairs posteriorly; profemur dorsum without hairs and sparse suberect hairs ventrally. Protibia without or with one stout apical seta, ventral apex and probasitarsus with dense yellow appressed pilosity; other protarsal segments with robust setae ventrally. Mid and hind legs with fine pubescence and sparse suberect yellow hairs on ventral side of coxae, femora and tibiae; five to six stout setae on mesotibial apex and two on metatibial apex. Tarsi with robust setae. Petiole and gaster finely pubescent with sparse erect and suberect yellow long and medium hairs.

Mandible black, reddish black, red or ferruginous. Antennae reddish black or ferruginous. Body black. Legs black or reddish black.

Measurements: Workers (n= 30): HW: 1.47 – 2.24mm; HL: 1.59 – 2.20mm; CI: 88 – 102; CD: 0.10 – 0.20mm; SL: 1.39 – 1.84mm; EL: 0.28 – 0.41mm; REL: 16.66 – 21.62; WL: 2.33 – 3.14mm; PnW: 0.94 – 1.43mm; TL: 1.22 – 1.75mm; NW: 1.02 – 1.34mm; NL: 0.57 – 0.82mm; PetII: 154 – 182; PPL: 1.02 – 1.51mm.

Similar species: *Pachycondyla harpax* is very similar to *P. lenis*, differing by its strigulate sculpturing on pro and mesonotum, which is punctate in *P. lenis*, and the presence of a medial longitudinal clypeal carina in *P. lenis*, lacking in *P. harpax*. Some smaller *P. striata* workers may have similar size to the largest *P. harpax* workers, but the general integument sculpturing, coarsely striate, and humeral angle overhanging the pronotal sides in *P. striata* differs it from *P. harpax*, that have weaker striate and do not presents humeral angle overhanging the pronotal sides.

Distribution: This species occurs in all states that we have register of *Pachycondyla*, occupies every biome with a wide range of altitudes (85-1136m).

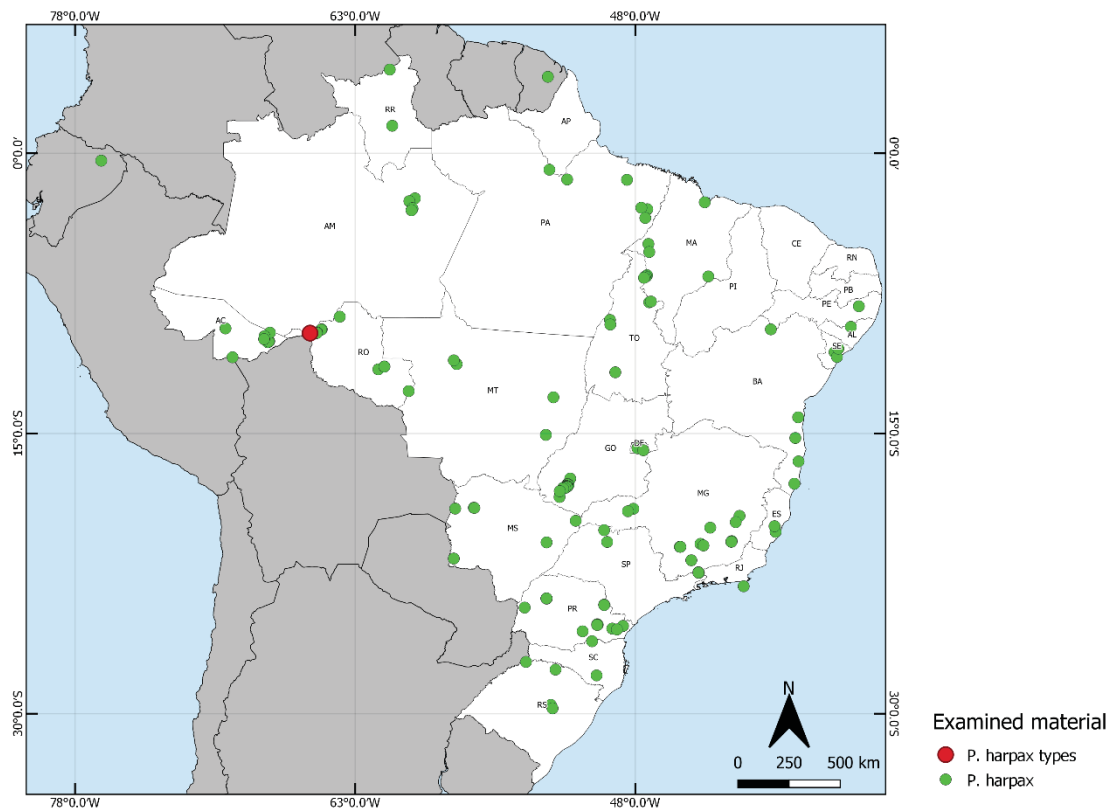


Fig 28- Examined material distribution map and type material locality of *P. harpax*.

Discussion: We examined over 400 specimens from throughout Brazil and we recognize three major morphologies on genal sculpturing, it can present longitudinal costulae, longitudinal striate-reticulare or strigulated to punctate. *Pachycondyla harpax* also varies on clypeus shape, it can present medial inflexion, granting a concave anteromedian margin or the inflexion can be absent, forming a straight to weakly convex anteromedian clypeal margin. We also identify multiple forms of subpetiolar process shape and prora shape. We tried to correlate these variations with geographical ranges, obtaining no success on identifying obvious distribution pattern with none of the morphological features mentioned. We also tried to correlate one variation with another but it seems that these variations can occur independently. Longino (2001) mentions variability over development of humeral carina of some specimens from Costa Rica. We also found such variability in *P. harpax* from Brazil.

Pachycondyla harpax has the most continuous distribution of all species within the genus, it occurs from northern Argentina to Texas, Louisiana and Georgia. The occurrence of *P. harpax* on the West Indian islands of Margarita, Trinidad and Tobago

are not considered exotic there, since these islands were part of the continental extension of South America 15,000 – 30,000 years ago (Lambeck et al., 2014 *apud* Wetterer, 2016). Occurrence of this species on Grenada, Guadalupe and Jamaica are considered exotic but the only registers of this species on these islands are in preserved forests, an uncommon place for exotic species (Wetterer, 2016).

A karyotype study of *P. harpax* populations on southern Bahia revealed two different karyotypes for *P. harpax* (Velasco et al., 2014) which when combined with previous studies (Mariano, et al., 2006) sets *P. harpax* with three differing karyotypes, strongly suggesting presence of cryptic species under the same morphospecies. Velasco et al. (2014), also reports a diploid male for this species. All of the previous leads us to believe that *P. harpax* is probably a species complex, with more than one species under the same name.

Parasitism of *P. harpax* by the fungus *Ophiocordyceps evansii* (Sanjuan et al., 2015; Shrestha et al., 2017) and by the phorid fly *Metopina pachycondylae* (Wheeler & Wheeler, 1952) are reported.

Occasional nesting in bromeliads of the genus *Hohenbergia* with suspended soil on their roots is recorded (DaRocha et al., 2015). It is the only register of a *Pachycondyla* species nesting in places other than on ground level.

Examined material: n = 406: BRAZIL: **Acre:** 1 worker, Assis, Brasil: RESEX Chico Mendes, 10°55'22.10"S 69°34'8.50"W, 15.v.2017, (Costa et al.) [UFAC]; 1 worker, Bujari, Walter Acre, 9°48'0.46"S 67°51'26.95"W, 06.vi.2017, (Fontenele et al.) [UFAC]; 1 worker, Manuel Urbano, Parque Estadual Chandless, 09°22'48.4"S 69°56'46.2"W, 10.xi.2015, (Schmidt et al.) [UFAC]; 2 workers, Porto Acre, Fazenda Júlio, 9°36'28.60"S 67°34'6.15"W, 12.vi.2017, (Fontenele et al.) [UFAC]; 1 worker, Porto Acre, Humaitá, 09°45'15.2"S 67°39'44.9"W, 04.vii.2017, (Fontenele.) [UFAC]; 2 workers, Rio Branco, UFAC: Parque Zoobotânico, 9°57'13.8"S 67°52'38.2"W, 25.vi.2016, (Schmidt et al.) [UFAC]; 1 worker, Senador Guimard, F. E. Catuaba, 10°04'00,5"S 67°36'18.5"W, 06.ii.2015, (Schmidt et al.) [UFAC]; 2 workers, Senador Guimard, F. E. Catuaba, 10°04'23.0"S 67°36'43.7"W, 22.i.2016, (Schmidt et al.) [UFAC]; 1 worker, Senador Guimard, Fazenda Fátima, 10°06'58.02"S 67°41'6.90"W, 29.v.2017, (Fontenele et al.) [UFAC]; 1 worker, Senador Guimard, Fazendo Experimental Catuaba, 10°4'40"S 67°37'35"W, 07.ix.2016, (Grupo 1) [DZUP]; 3 workers, Senador Guimard, F. E.

Fransisco, 10°06'05.5"S 67°37'59"W, 25.v.2015, (Oliveira et al.) [UFAC]; 4 workers, Senador Guimard, F. E. Catuaba, 10°04'40"S 67°37'35"W, 25.v.2015, (Oliveira et al.) [UFAC]. **Alagoas:** 1 worker, Quebrângulo, 0919S 3628W, 31.viii.1999, (Santos, J. R. M) [MZSP]. **Amazônas:** 1 worker, Manaus, Reserva Caueiras, [2°34'S] [60°06'W], 31.iii.2005, (F. B. Baccaro) [INPA]; 2 workers, Manaus, Reserva Caueiras, 2°34'S 60°06'W, 03.vii.1990, (M. O. de A. Ribeiro) [INPA]; 1 worker, Manaus, Faz. Esteio Florestal, [3°03'16.6"S] [59°59'04.6"W], 20.iii.1983, (A. Y. Harada) [INPA]; 1 worker, Manaus, Reserva Ducke, -59.92989880 -2.97615565, 19.vii-12.x.2006, (J. L. P. Souza) [INPA]; 1 worker, Manaus, Reserva Ducke, 2°56'31.65"S 59°56'39.37"W, 06.x.2006, (J. L. P. Souza & P. Y. Oliveira) [INPA]; 1 worker, Manaus, 2°25'S 59°48'W, 20.ix.1996, (A. C. Macedo et al.) [INPA]; 1 worker, Manaus, [2°25'S] [59°48'W], 31.iii.05, (F. B. Baccaro) [INPA]. **Bahia:** 2 workers, Arataca, [15°14'47"S] [39°25'37"W], 19.xi.1996, (Santos, J. R. M.) [DZUP]; 1 worker, Caravelas, Mussunuga, 17°41'31"S 39°28'38.6"W, 14-17.vii.2014, (T. Vargas) [UFV]; 1 worker, Porto Seguro, Parna do Pau Brasil, [16°29'54.2"S] [39°15'20.8"W], v.2015, (T. Vargas) [UFV]; 1 worker, Porto Seguro, Parna do Pau Brasil, [16°29'54.2"S] [39°15'20.8"W], v.2015, (T. Vargas) [UFV]; 2 workers, Travessão, 14°08'13"S 39°16'39"W, 28.iv.1997, (Santos, J. R. M.) [DZUP]. **Distrito Federal:** 1 worker, Brasília, NE. Paranoá, [15°54'04.7"S] [47°34'06.0"W], 19.iv.1975, (J. Diniz) [DZUP]; 2 workers, Brasília, UNB, Minhocão, [15°45'41.3"S] [47°52'13.9"W], 17.iii.1975, (J. Diniz) [DZUP]; 1 worker, Brasília, Vila Piauí, [15°47'45.1"S] [47°52'49.6"W], 17.xi.1995, (J. Diniz) [DZUP]. **Espírito Santo:** 2 workers, Cariacica, Rebio Duas Bocas – sede, -20.272615 -40.479709, iii.2003, (S. Simon) [UFV]; 3 workers, Santa Teresa, Est. Biol. Santa Lúcia, 19°57'58.4"S 40°32'21.2"W, 30.i.2015, (T. Vargas) [UFV]. **Goiás:** 10 workers, Jataí, Faz. Ariranha, 17°57'34"S 51°51'34"W, 11.ii.2009, (G. G. Santos) [DZUP]; 4 workers, Jataí, Faz. Ariranha, 17°54'34"S 51°51'34"W, 11.ii.2009, (G. G. Santos) [DZUP]; 9 workers, Jataí, Faz. Lageado, 17°49'51"S 51°37'21"W, 19.ii.2009, (Gilmar G. Santos) [DZUP]; 7 workers, Jataí, Faz. Leão, 17°48'24"S 51°41'41"W, 21.ii.2009, (Gilmar G. Santos) [DZUP]; 6 workers, Jataí, Faz. Primavera, 17°51'54"S 51°39'56"W, 09.xi.2008, (Gilmar G. Santos) [DZUP]; 1 worker, Jataí, Faz. Primavera, 17°51'54"S 51°39'56"W, 09.xi.2008, (Gilmar G. Santos) [DZUP]; 3 workers, Jataí, Faz. Rio Paraíso, 17°44'55"S 51°34'35"W, 10.xi.2015, (Diniz) [DZUP]; 9 workers, Jataí, Faz. Rio Paraíso, 17°42'48"S 51°37'39"W, 02.xi.2011, (J. Diniz) [DZUP]; 9 workers, Jataí, Faz. Rio Paraíso, 17°44'8"S 51°38'20"W, 06.xi.2011, (J. Diniz) [DZUP]; 3 workers, Jataí Faz. Rio Paraíso, 17°44'30"S

51°37'13"W, 03.xi.2011, (J. Diniz) [DZUP]; 1 worker, Jataí, Faz. Rio Paraíso, 44°55'S
 51°34'35"W, 10.xi.2011, (J. Diniz) [DZUP]; 7 workers, Jataí, Faz. Sta. Gertrudes,
 17°50'07"S 51°43'04"W, 02.ii.2009, (Gilmar G. Santos) [DZUP]; 5 workers, Jataí, Faz.
 Santa Lúcia, 17°50'15.7"S 51°39'23.9"W, 11.x.2009, (Gilmar G. Santos) [DZUP]; 2
 workers, Jataí, Faz. Sertãozinho, 17°55'14"S 51°45'25"W, 18.ii.2009, (Gilmar G. Santos)
 [DZUP]; 61 workers, Jataí, M. Açude, 17°51'31"S 51°43'37"W, 16.xii.2005, (Gustavo G.
 Paniago) [DZUP]; 15 workers, Jataí, Res. Mata do Açude, [17°51'31"S] [51°43'37"W],
 24.viii.2000, (J. M. Diniz & Sinara C. Moraes) [DZUP]; 2 workers, Montividiu, Faz.
 Veneza, 17°24'54.62"S 51°29'2.44"W, 07.iii.2009, (Gilmar G. Santos) [DZUP]; 7
 workers, Serranópolis, Faz. Perdiz, 18°24'16"S 52°03'20"W, 12.iv.2009, (Gilmar G.
 Santos) [DZUP]; 9 workers, Serranópolis, Faz. São Cristovão, 18°5'32.87"S
 52°2'23.85"W, 10.i.2009, (Gilmar G. Santos) [DZUP]; 1 worker, Serranópolis, Faz. Bom
 Jardim, 18°05'26.6"S 52°02'22.3"W, 10.i.2009, (Gilmar G. Santos) [DZUP]. **Maranhão:**
 13 workers, Açailândia, Horto Fazenda Pompeia, 04°51'30"S 47°17'40"W, 13-22.ii.2006,
 (Silva, R. R. & Feitosa, R. M.) [MZSP]; 1 worker, Bom Jesus, Pastos Bons,
 [06°35'56.5"S] [44°05'12.7"W], 09.i.2019, (without collector), ATPFOR1945, [MPEG];
 1 worker, Estreito, Fazenda Itaueiras, 06°31'54.4"S 47°22'16.0"W, 12-22.vi.2006, (Silva,
 R. R. & Feitosa, R. M.) [DZUP]; 18 workers, Estreito, Fazenda Planalto, 06°35'59.3"S
 47°24'50.4"W, 12-22.vi.2006, (Silva, R. R. & Feitosa, R. M.) [MZSP]; 3 workers, São
 Francisco do Brejão, 05°17'19,0"S 47°15'01,7"W, 01-09.vi.2005, (Silva, R. R. & Feitosa,
 R. M.) [MZSP]; 1 worker, São Luis, Sitio Mancallo, [02°37'34.0"S] [44°16'40.9"W],
 16.i.2019, (without collector), ATPFOR1939, [MPEG]. **Minas Gerais:** 1 worker, Boa
 Esperança, 21°04'16.8"S 45°36'36.6"W, 19.iii.2014, (Queiroz et al.) [DZUP]; 1 worker,
 Boa Esperança, 41°04'20.7"S 45°35'09.2"W, 19.iii.2014, (Queiroz et al.) [DZUP]; 1
 worker, Boa Esperança, 21°04'20.7"S 45°35'09.2"W, 19.iii.2014, (Queiroz et al.) [DZUP];
 1 worker, Ipaba, Faz. Macedônia, RPPN/CENIBRA, [19°24'51.8"S] [42°24'54.3"W],
 xi.2005, (T. Marques) [UFV]; 1 worker, Nova Lima, Vale/AS, Mina cap. Xavier,
 20°2'47"S 43°58'59"W, 12.ii.2012, (Queiroz et al.) [DZUP]; 1 worker, Poço Fundo,
 21°47'28.82"S 44°59'50.57"W, 10.ii.2015, (Angotti et al.) [DZUP]; 1 worker, Ritápolis,
 21°00'00.73"S 44°20'52.10"W, ii.2012, (M. Padilha) [UFV]; 4 workers, São Tiago,
 Floresta Faz. Casa Nova, [20°54'39.8"S] [44°30'30.8"W], iii.2012, (M. A. Padilha)
 [UFV]; 1 worker, Timoteo, Parque Estadual do Rio Doce (PERD), 19°45'S-19°46'S
 42°37'W, iii.2009, (F. A. Schmidt) [UFV]; 1 worker, Uberlândia, Fazenda Floresta do
 Lobo, 19°02'04"S 48°05'59"W, 01.xii.2009, (Pacheco, R. et al.) [DZUP]; 1 worker,

Uberlândia, E. E. Panga, 19°10'02"S 48°23'37"W, 01.xii.2009, (Pacheco, R. et al.) [DZUP]; 1 worker, Viçosa, Bairro Cristais, 20°46'S 42°50'W, 20.iv.2013, (Jesus & Chaul) [UFV]; 1 worker, Viçosa, Mata do Paraíso, 20°48'S 42°51'W, i.2010, (L. Audino) [UFV]; 1 worker, Viçosa, Mata do Paraíso, 20°48'8.49"S 42°51'31.47"W, 8.iii.2013, (S. Hosken) [UFV]. **Mato Grosso:** 1 worker, Canarana, 13°04'S 52°23'W, vi.2013, (M. Bicalho & V. Ribeiro) [UFV]; 1 worker, Juara, 11°17'22"S 57°33'55"W, ii.2015, (Santos, R.) [DZUP]; 1 worker, Juara, 11°5'24.7"S 57°43'6.5"W, ii.2015, (R. Santos) [DZUP]; 1 worker, Novo S. Joaquim, Cachoeira da Fumaça, 15°04'42.7"S 52°47'15.7"W, 09.iv.2011, (Frizzo, T. & Vasconcelos, H.) [DZUP]. **Mato Grosso do Sul:** 1 worker, Corumbá, 18°59'17"S 56°37'08"W, 18-22.vii.2016, (Reis Filho, W. et al.) [DZUP]; 6 workers, Corumbá, Fazenda Nhumirim, [19°01'31.1"S] [57°38'34.4"W], 18-20.vii.2016, (Reis Filho, W. et al.) [DZUP]; 1 worker, Corumbá, 18°58'45"S 56°38'33"W, 13-14.i.2016, (Reis Filho, W. et al.) [DZUP]; 8 workers, Paraníba, Foz. Fortaleza, [19°40'40.6"S] [51°11'22.5"W], 18.ii.1976, (J. Diniz) [DZUP]; 3 workers, Porto Murtinho, Chaco Florestado, Faz. Patolá, 21°42'0.29"S 57°43'7.73"W, 07.iii.2012, (Souza, P.R. & Rodrigues, N.) [DZUP]. **Pará:** 1 worker, Belém, Utinga, [01°25'29.6"S] [48°26'36.3"W], 10.i.1980, (Torres, M. F.), ATPFOR1933, [MPEG]; 1 worker, Gorupá, 1.204°S 51.818°W, 18.x.2003, (J. M. S. Vihena) [INPA]; 12 workers, Jari, Amazônia, 0°53'S 52°36'W, 2011, (Silva, E. A.) [DZUP]; 1 worker, Paragominas, Rede Amazônia Sustentável, UTM X 226174.31 UTM Y 9616513.38, i-vii.2011, (Solar, R. et al.) [UFV]; 1 worker, Paragominas, Rede Amazônia Sustentável, UTM X 202501.165 UTM Y 9676701.385, i-vii.2011, (Solar, R. et al.) [UFV]; 1 worker, Paragominas, 2°59'51"S 47°21'13"W, 1.vii.2011, (R. Solar) [UFV]; 1 worker, Parauapebas, Flona de Carajás, 589.734.045 9.328.709.001, 22.ii.2010, (A. A. Matias) [INPA]. **Paraná:** 2 workers, Antonina, Res. Nat. Guaricica, -25.3058° -48.6576, 23-24.iv.2017, (E. Villarreal. J. Lattke) [DZUP]; 1 worker, Curitiba, Mata Viva; Centro Politécnico, [25°26'51"S] [49°13'56"W], 15.x-10.xii.2008, (Moussalen, M.) [DZUP]; 1 worker, Irati, Guamirim. Fz. Arroio Grande, Talhão, 15-AI, 25°35'36.11"S 50°49'12.06"W, 28.xi.2014, (Marques, C. G. P & Falbot, L.) [DZUP]; 3 workers, Jaguariaiva, Parque Estadual do Cerrado, 24°10'04.7"S 49°39'59.8"W, 15.i.2015, (A. M. Oliveira, R. Feitosa, J. Maravalhas, H. Vasconcelos) [DZUP]; 2 workers, Jaguariaiva, Parque Estadual do Cerrado, 20°10'47.6"S 49°40'05.5"W, 15.i.2015, (A. M. Oliveira, R. Feitosa, J. Maravalhas, H. Vasconcelos) [DZUP]; 2 workers, Jaguariaiva, Parque Estadual do Cerrado, 24°11'15.9"S 49°39'53.1"W, 15.i.2015, (A. M. Oliveira, R. Feitosa, J. Maravalhas, H. Vasconcelos)

[DZUP]; 4 workers, Palotina, Parque Estadual São Camilo, 24°19.276'S 53°55.247"W, 23.ix.2015, (Busanesso, D. & Caron, E.) [DZUP]; 3 workers, Palotina, Parque Estadual São Camilo, 24°19.288'S 53°54.842'W, 23.ix.2015, (Busanesso, D. & Caron, E.) [DZUP]; 1 worker, Piraquera, Mananciais da Serra, 25°29'46"S 48°58'54"W, 01-08.xi.2007, (Grossi, P. & Parizotto, D.) [DZUP]; 8 workers, Ponta Grossa, P. E. Vila Velha - Campo sujo., 25°14'37.85"S 50°00'44.05"W, 24-28.xi.2014, (W. Franco, R. M. Feitosa, A.C. Ferreira, F. Benatti) [DZUP]; 1 worker, Ponta Grossa, P. E. Vila Velha - F. O. Mista, 25°15'19.56"S 50°02'26.42"W, (without date), (W. Franco, R. M. Feitosa, A.C. Ferreira, F. Benatti) [DZUP]; 1 worker, Ponta Grossa, P. E. Vila Velha, 25°13'19.56"S 50°02'26.42"W, (without date), (W. Franco, R. M. Feitosa, A.C. Ferreira, F. Benatti) [DZUP]; 1 worker, Ponta Grossa, P. E. Vila Velha – Fortaleza, 25°13'7.51"S 50°02'08"W, 19-22.xii.2016, (R. Feitosa, W. Franco, A. C. Neundorf, Y. S. Moreira) [DZUP]; 7 workers, Tuneiras do Oeste, Reserva Biológica de Perobas, 23°50'39"S 52°44'43.26"W, 18.ix.2015, (Busanesso, D. & Caron, E.) [DZUP]; 1 worker, Tuneiras do Oeste, REBIO das Perobas, 20°50'S 52°45'W, 18.ix.2015, (E. Caron) [DZUP]; 1 worker, Tuneiras do Oeste, REBIO das Perobas, 23°50'S 52°45'W, 18.ix.2015, (E. Caron) [DZUP]; 3 workers, Tuneiras do Oeste, Reserva Biológica de Perobas, 23°50'5.64"S 52°45'37.52"W, 18.ix.2015, (Busanesso, D. & Caron, E.) [DZUP]. **Pernambuco:** 1 gyne, Carnaru, [8°11'32.2"S] [36°01'27.7"W], iv.1972, (M. Alvarenga) [MZSP]; 1 worker, Tapera, [9°25'52.1"S] [40°44'16.1"W], (without date), (B. Pickal) [MZSP]. **Rondônia:** 1 worker, Cacoal, Área Periurbana, 11°25'10.9"S 61°26'07.5"W, v.2013, (Silva, L.S) [DZUP]; 1 worker, Cacoal, Área de Mata, 11°25'32.4"S 61°26'18.0"W, viii.2013, (Silva, L.S.) [DZUP]; 1 worker, Porto Velho, Área Abiunã, 09°38'05.6"S 65°27'11.2"W, 04-18.ix.2012, (Vicente, RE & Oliveira, J.) [DZUP]; 2 workers, Porto Velho, Área Caiçara, 09°26'46.8"S 64°49'31.1"W, 04-18.ix.2012, (Vicente, RE & Oliveira, J.) [DZUP]; 1 worker, Porto Velho, Área Caiçara, 09°25'49"S 64°47'34"W, 02-16.x.2013, (Mazão G.R. & Mendonça, R.T.T.) [DZUP]; 2 workers, Porto Velho, Área Caiçara, 09°26'46.8"S 64°49'31.1"W, 04-18.ix.2012 (Vicente, RE & Oliveira, J.) [DZUP]; 3 workers, Porto Velho, Área Mutum, 09°37'42.9"S 65°03'27.8"W, 04-18.ix.2012, (Vicente, RE & Oliveira, J.) [DZUP]; 1 worker, Porto Velho, Área Mutum, 09°35'41.6"S 65°03'54.2"W, 04-18.ix.2012, (Vicente, RE & Oliveira, J.) [DZUP]; 1 worker, Porto Velho, Área Mutum, 09°35'56"S 65°02'59"W, 04-18.ix.2012, (Vicente, RE & Oliveira, J.) [DZUP]; 3 workers, Porto Velho, Área Mutum, 09°35'29.5"S 65°02'57.6"W, 04-18.ix.2012, (Vicente, RE & Oliveira, J.) [DZUP]. **Roraima:** 2 workers, Boa Vista, V. Pacaraima,

[4°28'41.0"N] [61°08'47.8"W], 13-17.xii.1995, (A. Santos) [INPA]; 1 worker, Caracai, Parque Nacional do Viruá, 1.4686624S -61.015807W, 06.ii.2006, (J. L. P. Souza) [INPA]. **Rondônia:** 1 worker, Morrinhos, [8°45'09.9"S] [63°49'27.1"W], 02.ix.2011, (without collector) [INPA]; 1 worker, Rolim de Moura, Área Mata, -11.569964 - 61.760266, 08.x.2015, (Silva, E. A.) [UFV]; 1 worker, Vilhena, Est. Colorado, [12°44'06.4"S] [60°08'05.3"W], 23.vii.1983, (A. Y. Harada) [INPA]. **Rio Grande do Sul:** 2 workers, Derrubadas, Parque Estadual do Turvo, [27°13'57.4"S] [53°51'04.8"W], 25.iv.2009, (T. Marques) [UFV]; 1 worker, Erechin, [27°38'39.2"S] [52°16'13.2"W], vii.1960, (F. Plaumann) [MZSP]; 2 workers, Santa Cruz do Sul, [29°43'11"S] [52°25'48"W], 23.xi.2009, (Lemes, J. R. A.) [DZUP]; 1 worker, Sinimbu, [29°32'03.0"S] [52°31'19.9"W], ix.1960, (F. Plaumann) [MZSP]. **Rio de Janeiro:** 1 worker, Ilha Grande, Trilha Parnaioca, 23°11'02"S 42°11'39"W, 01.xii.2009, (A. J. Mayhê) [DZUP]; 2 workers, Itatiaia, P. N. Itatiaia, 22°25'51.62"S 44°36'57.36"W, 20.i.2015, (Lasmar et al.) [DZUP]; 2 workers, Itatiaia, P. N. Itatiaia, 27°27'08.56"S 44°36'55.74"W, 20.i.2015, (Lasmar et al.) [DZUP]; 2 workers, Itatiaia, P. N. Itatiaia, 22°27'46.56"S 44°35'34.21"W, 20.i.2015, (Lasmar et al.) [DZUP]. **Santa Catarina:** 2 workers, Paineira, Base Avançada do IBAMA, [27°57'22"S] [50°04'22"W], 18.v.2013, (Feitosa, R. M. et al.) [DZUP]; 1 worker, Três Barras, FLONA de Três Barras., 26°07'35.56"S 50°18'51.17"W, 21.xii.2014, (Ortiz, D. C. et al.) [DZUP]. **São Paulo:** 1 worker, Mirassol, Grota Reserva, [20°48'41.4"S] [49°30'14.5"W], 27.iii.1976, (J. Diniz) [DZUP]; 1 worker, Mogi-Guaçu, Fazenda Campininha, 22°25'92"S 47°19'18"W, 12.i.2016, (Salles, L.) [DZUP]. **Sergipe:** 2 workers, Malhador, 10°39.3'S 37°19.6'W, 04.iii.2014, (Almeida, R. P. S.) [DZUP]; 1 worker, N. S. das Dores, 10°27.5'S 37°07.6'W, 1.ix.2014, (Almeida, R. P. S.) [DZUP]; 1 worker, Nossa Senhora das Dores, 10°27.5'S 37°07.6'W, 1.ix.2014, (Almeida, R. P. S.) [MPEG]; 2 workers, São Cristóvão, 20°05'96.8"S 43°57'64"W, ???.2015, (Oliveira, I. R. P.) [DZUP]; 1 worker, S. Cristóvão, 10°54.3'S 37°11.7'W, 1.xi.2014, (Almeida, R. P. S.) [DZUP]. **Tocantins:** 1 worker, Aguiarnópolis, 06°36'49,4"S 47°28'53,2"W, 01-09.vi.2005, (Silva, R. R. & Feitosa, R. M.) [MZSP]; 1 worker, Araguacema, Rio Cocalinho, 08°55'33"S 49°21'14"W, 16-30.xi.2005, (Silva, R. R. & Feitosa, R. M.) [MZSP]; 1 worker, Dois Irmãos, 09°10'20"S 49°20'10"W, 16-30.xi.2005, (Silva, R. R. & Feitosa, R. M.) [MZSP]; 1 worker, Goiatins, 07°58'45,4"S 47°15'02,6"W, 03-08.v.2005, (Silva, R. R. & Dietz, B. H.) [MZSP]; 1 worker, Gurupi, [11°43'42.4"S] [49°04'05.9"W], 30.ix-03.x.2001, (Albuquerque & Silva) [MZSP]; 1 worker, Palmeira do Tocantins, 06°40'12,1"S 47°31'48,6"W, 01-09.vi.2005, (Silva, R. R. & Feitosa, R. M.) [MZSP].

COSTA RICA: 1 worker, Costa Rica, San José, [9°56'14.2"N] [84°05'56.7"W], 1940, (H. Schmidt) [DZUP]; GUIANA FRANCESA: 1 worker, França, Guiana Francesa, Cayenne, Natural Reserve Station, 102 SW of Cayenne, 4,08799 -52.67978, 21.viii-1.ix.2018, (A. C. Ferreira) [DZUP].

3.7- *Pachycondyla impressa* (Roger, 1861).

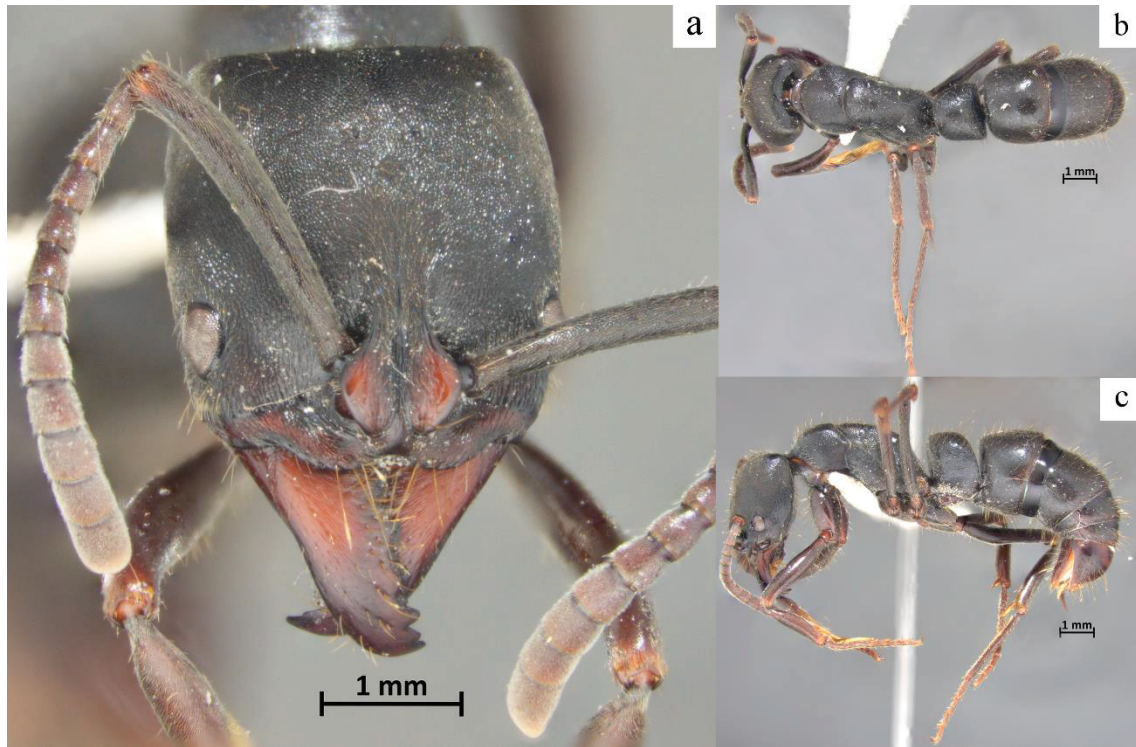


Fig 29: *Pachycondyla impressa* (DZUP 548859), a: head in frontal view, b: full body in dorsal view; c: full body in lateral view.

Taxonomic history: *Ponera* (*Pachycondyla*) *impressa* Roger, 1861: p.6. Syntype workers COLOMBIA, no accurate locality given (*Moritz*) [ZMHB]. [high resolution images examined ([FOCOL0951](#), photography by Christiana Klingenberg); ([FOCOL0952](#), photography by Christina Klingenberg)]. Syntype gyne, COLOMBIA, no accurate locality given (*Moritz*) [ZMHB]. [high resolution images examined ([FOCOL0953](#), photography by Christina Klingenberg)]. [Combination in *Pachycondyla*: Roger, 1863. p.18]

Pachycondyla transversa Emery, 1890: p.58: Syntype workers COSTA RICA, Aleluja, Lat. 10.01667 Long. -84.21667, 1100m elevation (*Emery*) [MCSN]. [data available from AntWeb [JTL008003](#)]. Lectotype gyne COSTA RICA, Aleluja, Lat. 10.01667 Long. -

84.21163 (*Emery*) [MSNG]. [high resolution images examined ([CASENT0903887](#), photography by Will Ericson)] [Junior synonym of *impressa*: Kempf, 1961e: p. 195].;

Pachycondyla fuscoatra montana Forel, 1912: p.39: Lectotype worker COLOMBIA, San Antonio, Lat. 6.958056 Long. -75.5325 (*Forel*) [MHNG]. [high resolution images examined ([CAZENT0907249](#), photography by Will Ericson)] [Junior synonym of *impressa*: Kempf, 1961: p.195].

Pachycondyla fuscoatra andicola Santschi, 1913: p.34: Holotype worker ECUADOR, Santo Domingo de los Colorados [exemplar not found]. [Junior synonym of *impressa*: Kempf, 1961: p.195].

Worker diagnosis: The following suite of characters diagnoses this species:

- 1- Large body size (> 10 mm).
- 2- Clypeal distance less than antennal scape width.
- 3- Central clypeal margin with strong concavity.
- 4- Humeral angle does not overhang pronotal side.
- 5- Absence of shining sharp humeral carina.
- 6- Propodeal declivitous margin without low lateral expansions.

Worker description: Mandible triangular in dorsal view with nine to ten teeth along masticatory margin, five smaller intercalary teeth present between four to five larger teeth; dorsum finely striate from base to masticatory margin. Head subquadrate in full-face view, with straight to weakly convex lateral margin and weakly concave posterior margin. Clypeal anteromedian margin concave, median clypeal area longitudinally elevated, extending posteriorly between frontal lobes, finely longitudinally striate. Dorsal malar area longitudinally striate. Frons with fine longitudinal rugulose-striae, striae diverging posteriorly becoming rugulose punctate on vertex. Ventral surface of head with U-shaped striae, laterally longitudinally, medially and anteriorly convex. Scape reaching vertex, surpassing by less than one apical width or not surpassing it when stretched posteriorly, with piligerous punctulae.

Mesosomal dorsal margin smoothly convex in lateral view, propodeal declivitous margin weakly concave. Humeral carina absent, humeral angle without swollenness, dorsal pronotal face forms blunt right angle with lateral face, lateral face mostly broadly convex; pronotal dorsum anteriorly with transverse striae that curve posteriorly on sides

forming U-shaped pattern, dorsomedially with narrow band of longitudinal striae, lateral pronotal surface longitudinally strigulate. Propleuron longitudinally striate-punctulae. Mesonotum to most of propodeal dorsum longitudinally striate in dorsal view, posterior propodeal dorsal face transversely striate. Mesopleural sulcus poorly developed, almost absent; mesometapleuron and lateral propodeal face continuously longitudinally to slightly obliquely striate; rugulose on bulla.

Propodeal declivity transversally striate anteriorly and laterally, with smooth and shining posteromedian area; length of dorsal margin in lateral view three fourths of declivitous margin.

Petiolar node shaped as rounded trapezoid in dorsal view, anterior margin broadly convex narrower than posterior margin, lateral margin weakly convex to straight, posterior margin weakly convex, forming blunt acute angle with lateral margin. Node higher than long in lateral view; anterior margin slightly anteriorly inclined, almost parallel with posterior margin; node in posterior view subquadrate, with convex sides, widest at mid-height; anterior surface finely imbricate, dorsal surface transversely striate, lateral surfaces imbricate to finely striate and posterior surface transversely strigulate and finely imbricate ventrolaterally. Subpetiolar process roughly subtriangular in lateral view, anterior margin straight, forming posteroventrally projecting blunt tooth; ventral-posterior margin broadly convex, ventrally shape as ellipsoid, transversely costulate.

Gaster shining, finely imbricate; anterior margin of abdominal tergite III vertical and straight in lateral view, forming right angle with dorsal margin; abdominal tergite III dorsum finely imbricate anteriorly, posteriorly smooth and densely punctulate, IV dorsum shining and densely punctulate, V with longitudinal fine striate dorsally, laterally striae thicker; VI with denser longitudinal striation. Pygidium laterally with longitudinal striae and anterodorsally transversely striate; posteromedially with elongate flattened smooth and shining area. Pygidium in lateral view concave. Prora smaller than metatrochanter, resembling brief crest, rounded with small, almost absent ventrally projecting point. Sternites III-IV finely imbricate; V-VI smooth and shining with scattered punctae; hypopigium anteriorly imbricate, mostly smooth with scattered punctulae and punctae. Posterior margin strongly convex.

Mandible with sparse hairs on dorsum and two parallel rows of decumbent hairs along masticatory margin. Clypeal medial area without hairs, anterior margin with long

yellow setae, reaching third or fourth mandibular tooth. Head with appressed and decumbent pubescence, with sparse erect hairs on dorsal and ventral surfaces. Pubescence sparse anteromedially on ventral head surface.

Mesosoma finely pubescent, with sparse erect yellow hairs. Procoxa pubescent with long erect yellow hairs anteriorly and short erect hairs posteriorly; profemur dorsum without hairs and sparse suberect hairs ventrally. Protibia with one stout apical seta, ventral apex and probasitarsus with dense golden appressed pilosity; other protarsal segments with robust setae ventrally. Mid and hind legs with fine pubescence and sparse suberect yellow hairs on ventral side of coxae, femora and tibiae; five stout setae on mesotibial apex and three on metatibial apex. Tarsi with robust setae. Petiole and gaster finely pubescent with sparse erect and suberect yellow long and medium hairs.

Mandible reddish black or red. Body black or reddish black. Coxae black or reddish black.

Measurements: Workers (n= 3): HW: 2.49 – 2.82mm; HL: 2.63 – 3.02mm; CI: 93 – 94; CD: 0.12mm; SL: 2.20 – 2.53mm; EL: 0.53 – 0.57mm; REL: 19.70 – 21.31; WL: 3.81 – 4.00mm; PnW: 1.75 – 1.88mm; TL: 2.20 – 2.45mm; NW: 1.55 – 1.80mm; NL: 1.14 – 1.43mm; Pell: 114 – 137; PPL: 1.83 – 1.88mm.

Similar species: *Pachycondyla impressa* is very similar to *P. purpurascens*, *P. inca* and *Pachycondyla* sp. n. It differs from them by the clypeal distance and the conspicuous concavity on clypeal anterior margin present in *P. impressa* but absent in these three species. The clypeal size is the only feature that distinguishes *P. impressa* from *P. purpurascens* and *P. inca*. The clypeal distance of *P. impressa* is shorter than the width of the antennal scape, whereas in *P. purpurascens* and *P. inca* it is greater than antennal scape width.

Particularly from *Pachycondyla* sp. n by the petiolar shape, dorsal and posterior faces of petiolar sculpturing. *P. impressa* presents transverse striae on the petiolar dorsum and transverse subtrigulation on the petiolar posterior face while *Pachycondyla* sp. n is smooth and shining, only with piligerous punctures. The petiolar shape in *P. impressa* is subquadrate in posterior view while in *Pachycondyla* sp. n have the petiolar lateral margins gradually converging ventrally, resembling to an upside down subtriangular shape.

Pachycondyla impressa differs from *P. fuscoatra* principally by the humeral angle overhanging pronotal sides in *P. fuscoatra* and not present in *P. impressa*.

Distribution: No specimen of this species was found in Brazil. All samples we were able to examine came from Costa Rica, Ecuador, and Venezuela.



Fig 30- Examined material distribution map and type material locality of *P. impressa*.

Discussion: We studied images of the types of *P. impressa*, the exemplars originally from Colombia deposited in ZMNH ([FOCOL0951](#), photography by Christiana Klingenberg; [FOCOL0952](#), photography by Christina Klingenberg; [FOCOL0953](#), photography by Christina Klingenberg). From this point we could compare the type material with the descriptions of the species and exemplars we have, establishing the species identity.

Pachycondyla impressa is a key species for understanding the taxonomy of the genus. It is the central species of the *impressa* species group conceptualized here. In particular, one morphological feature (the longitudinal lateral pygidial costulae) is central in the synonymy of *P. transversa*, *P. purpurascens*, *P. inca*, *P. cearensis*, *P. montana* and *P. andicola* into *P. impressa*, by Kempf (1961).

The longitudinal lateral pygidial costulae have been used as a diagnostic character by Kempf (1961) and MacKay & MacKay (2010) but *P. impressa* shares this feature with all *impressa* species group. Unfortunately, Kempf overlooked the clypeal distance, the humeral angle shape, the petiolar sculpturing and shape, leading him to synonymize *P. purpurascens* and *P. inca* with *P. impressa*. These two species are considered distinct from *P. impressa* by MacKay & MacKay (2010) which revive these species in their revision.

Another case exemplifying the identity confusion of *P. impressa* is the specimen of *P. fuscoatra*, identified as such by Santschi and Borgmeier but considered to be *P. impressa* by Kempf, based on the number of mandibular teeth and the pygidial longitudinal costulae. Our examinations of this exemplar and comparison with the original descriptions and other exemplars of *P. impressa* and *P. fuscoatra* disagree with Kempf's determination of this specimen and agrees with Santschi and Borgmeier (see [P. fuscoatra](#) discussion).

Kempf also did not recognize the distinct morphology of *Pachycondyla* sp. n, which we describe here. *Pachycondyla* sp. n has longitudinal costulae on the pygidium and greatly resembles *P. impressa* but the clypeus size, petiolar shape and sculpturing greatly diverges from *P. impressa*. Every Brazilian sample identified as *P. impressa* in his work that we were able to examine, are either *Pachycondyla* sp. n or *P. fuscoatra*. Kempf was not able to examine the *P. impressa* types and the original descriptions are vague. High resolution images of the types of *P. impressa* are available on internet, and despite not being ideal it is enough to observe the humeral angle shape which distinguishes *P. impressa* from *P. fuscoatra*, the clypeal distance which distinguish *P. impressa* from *P. purpurascens* and *P. inca* and the petiole dorsal sculpturing which distinguish *P. impressa* from *Pachycondyla* sp. n (see Similar species for details).

Longino, 2010 discusses a recent issue that further confuses the taxonomy of these species. He mentions that Emery included specimens from Costa Rica (Alajuela and Juan Viñas) in his original description of *P. transversa* but posteriorly reidentified the Juan Viñas specimens as *P. purpurascens*. Longino examined these specimens and matched the Alajuela specimen with *P. impressa* (which is a senior synonym of *P. transversa*) and the Juan Viñas specimens with *P. purpurascens*, agreeing with Emery's determinations. Unfortunately, MacKay & MacKay (2010) designated one of the Juan Viñas specimens as the *P. transversa* lectotype. This implies that future revisionary work

need to rename the *P. transversa* lectotype, designating the Alajeula queen, as pointed out by Longino (2010).

Pachycondyla impressa quickly hides and remains still under leaf litter when disturbed and nests on the humid forest floor (Longino, 2010). Some nests were found in logs in coffee farms in Coconusco, Mexico. Some pupae were parasitized by eucharitid wasps (De la Mora et al., 2016). This species is parasitized by *Ophiocordyceps evansii*, a fungus (Sanjuan et al., 2015).

Examined material: n = 57: COSTA RICA: 1 worker, San José, 9°56'14.2"N 84°05'56.7"W, 1940, (H. Schmidt) [DZUP]; 4 workers, San José, [9°56'14.9"N] [84°06'18.4"W], 1940, (H. Schmidt) [MZSP]; 4 workers, San José, [9°56'14.9"N] [84°06'18.4"W], (without date), (H. Schmidt) [MZSP]; 3 workers, Costa Rica, [9°55'29.5"N] [84°05'35.9"W], (without date), (F. Nevermann) [MZSP]. EQUADOR: 2 workers, Esmeraldas, [0°57'40.3"N] [79°38'31.9"W], 07.xi.1987, (Brandão & Bastidas) [MZSP]; 2 workers, Pichincha, Centr. Cient. R. Pienque, [0°10'14.6"S] [78°36'45.6"W], 01.i.1981, (Sonia Sandoval) [MZSP]; 3 workers, Pichincha, Centr. Cient. R. Pienque, [0°10'14.6"S] [78°36'45.6"W], 04.i.1981, (Sonia Sandoval) [MZSP]; 8 workers, Pichincha, Centr. Cient. R. Pienque, [0°10'14.6"S] [78°36'45.6"W], 07.iii.1981, (Sonia Sandoval) [MZSP]; 2 workers, Pichincha, Centr. Cient. R. Pienque, [0°10'14.6"S] [78°36'45.6"W], 10.i.1981, (Sonia Sandoval) [MZSP]; 4 workers, Pichincha, Centr. Cient. R. Pienque, [0°10'14.6"S] [78°36'45.6"W], 14.iii.1981, (Sonia Sandoval) [MZSP]; 11 workers, Pichincha, Centr. Cient. R. Pienque, [0°10'14.6"S] [78°36'45.6"W], 20.xii.1981, (Sonia Sandoval) [MZSP]; 2 workers, Pichincha, Centr. Cient. R. Pienque, [0°10'14.6"S] [78°36'45.6"W], 21.xii.1980, (Sonia Sandoval) [MZSP]; 2 workers, Pichincha, Centr. Cient. R. Pienque, [0°10'14.6"S] [78°36'45.6"W], 23.xii.1980, (Sonia Sandoval) [MZSP]; 5 workers, Pichincha, Centr. Cient. R. Pienque, [0°10'14.6"S] [78°36'45.6"W], 28.ii.1981, (Sonia Sandoval) [MZSP]. PANAMA: 1 worker, Ilha Barro Colorado, [9°09'08.9"N] [79°50'47.7"W], xi.1965, (H. Buitski) [MZSP]. SURINAME: 1 worker, La Paille, viii.1959, (I. V. D. Drift); 1 worker, Valle, Chanchanayo, [11°02'06.9"S] [75°07'33.9"W], 07.viii.1957, (Wayrauch) [MZSP]. VENEZUELA: 1 worker, La Toma, Aragua, Parque Nac. Henri Pittier, 10.34924°N 67.68251°W, 09-19.viii.2008, (AntCourse) [MZSP].

3.8- *Pachycondyla inca* Emery, 1901.



Fig 31: *Pachycondyla inca*.(syntype [MZSP]) a: head in frontal view. b: full body in dorsal view; c: full body in lateral view.

Taxonomic history: *Pachycondyla fuscoatra inca* Emery, 1901: p.48. Lectotype worker PERU, Ocobamba, Lat. -14.430296 Long. -71.10783 (*Staudinger*) [MSNG]. [high resolution images examined ([CASENT0903888](#), photography by Will Ericson)]; Syntype worker, PERU, Ocobamba (*Staudinger*) [MZSP]. [examined] [junior synonym of *impressa* Kempf, 1961. p.195] [revived from synonymy, *Pachycondyla inca* Emery; MacKay & MacKay, 2010: p. 400]

Pachycondyla fuscoatra cearensis Forel, 1931: p.336. Lectotype worker BRAZIL, Ceara, Lat. -5.31168 Long. -39.52324 (*Rocha*) [MHNG]. [high resolution images examined ([CASENT0907247](#), photography by Will Ericson)] Syntype worker BRAZIL, Ceara. No accurate locality given (*Schmitt*) [MCZ]. [high resolution images examined [MCZT22858](#)] [junior synonym of *inca* MacKay & MacKay, 2010: p.400]

Worker diagnosis: The following suite of characters diagnoses this species:

- 1- Large body size (> 10 mm).
- 2- Mandible noticeably striate on dorsum.
- 3- Clypeal distance longer than antennal scape width.
- 4- Central clypeal margin without strong concavity.
- 5- Humeral angle does not overhang pronotal side.
- 6- Absence of shining sharp humeral carina.
- 7- Propodeal declivitous margin without low lateral expansions.
- 8- Petiole dorsum and posterior face transversely striate.
- 9- Thick light brown hair throughout body.

Worker description: Mandible triangular in dorsal view with nine teeth along masticatory margin, four smaller intercalary teeth present between five larger teeth; dorsum mostly smooth and with shining base with sparse punctae, rugose close to masticatory margin. Head subquadrate in full-face view, lateral margin weakly convex, posterior margin weakly concave; lateral margins between eye and mandible converging. Clypeal anteromedian margin mostly straight to slightly inflexed by median clypeal process, process longitudinally strigate, process dorsal margin convex in lateral view.

Dorsal malar area longitudinally striate. Frons finely striate, medially longitudinal, posterolaterally diverging. Ventral surface of head longitudinally strigulate laterally, strigulae curving medially close to hypostoma and postgenal bridge; posteromedially with concentric U-shaped strigulae next to postgenal bridge. Scape reaching vertex and surpassing it by apical scape width when stretched posteriorly, with piligerous punctulae.

Mesosomal dorsal margin weakly convex in lateral view, propodeal declivitous margin straight, forming blunt angles from lateral to dorsal faces. Humeral carina absent, humeral angle not overhanging pronotal side; pronotal dorsum anteriorly with transverse striae that curve posteriorly on side forming U-shaped pattern, lateral pronotal surface obliquely striate. Propleuron finely substrigulate. Mesonotum longitudinally striate in dorsal view. Mesopleural sulcus poorly developed, almost absent; mesopleural, anterior metapleuron and lateral propodeal face continuously obliquely striate, posterior metapleuron surface shining with piligerous punctulae, propodeal dorsum transversely striate. Propodeal declivity transversally striate anteriorly becoming smooth posteriorly; length of dorsal margin in lateral view subequal to that of declivitous margin, declivitous face curving smoothly onto lateral face.

Petiolar node trapezoid to subquadrate in dorsal view, anterior margin broadly convex, slightly narrower than posterior margin; lateral margin straight to weakly convex, posterior margin straight. Node higher than long in lateral view; anterior margin slightly anteriorly inclined, subparallel with posterior margin, dorsal margin convex, dorsoanterior angle sharper than dorsoposterior angle; node in posterior view subquadrate, sides subparallel converging ventrally. Anterior nodal surface slightly imbricate to coriaceous, dorsal surface transversely striate, lateral surfaces imbricate to finely striate and posterior surface transversely substrigulate and finely imbricate ventrolaterally. Subpetiolar process roughly subtriangular in lateral view, anterior margin broadly convex, forming brief posteroventrally projecting tooth; ventral margin broadly convex, almost rounded, anterior face smooth and shining, ventral face anteriorly shining with low rugosities, posteriorly transversely costulate.

Gaster matte, finely imbricate; anterior margin of abdominal tergite III vertical and straight in lateral view, forming right angle with dorsal margin; abdominal tergite III dorsal face anteriorly transversely striate, posteriorly finely imbricate, IV-VI finely imbricate to coriaceous; pygidium longitudinally striate laterally, dorsoanteriorly transversely striate, shining and slightly flattened postero-medially. Prora smaller than metatrocanter, subtriangular, anterior face straight followed by sinuous oblique margin ending in ventrally directed point, posterior margin concave, abdominal sternite III finely imbricate with scattered punctae IV-VI shining finely imbricate, hypopigium finely punctate anteriorly with bigger punctures posteriorly; posterior margin concave below stinger.

Mandible with sparse subdecumbent hairs on dorsum and two parallel rows of decumbent hairs along masticatory margin. Clypeal medial area with dorsally projecting long hairs, anterior margin with long yellow hairs, reaching third or fourth mandibular tooth. Head with appressed and decumbent pubescence, with erect thick light brown hairs on dorsal and ventral surfaces, more on dorsum than ventrum. Pubescence sparse anteromedially on ventral head surface.

Mesosoma finely pubescent, with sparse erect thick light brown hairs. Anteroventral pronotal margin with row of curved thick hairs.

Procoxa pubescent with long erect, thick light brown hairs anteriorly and short erect hairs posteriorly; profemur dorsum without hairs and sparse suberect hairs ventrally.

Protibia with one stout apical seta, ventral apex and probasitarsus with dense golden appressed pilosity; other protarsal segments with robust setae ventrally. Mid and hind legs with fine pubescence and sparse suberect yellow hairs on ventral side of coxae, femora and tibiae; five stout setae on mesotibial apex and two on metatibial apex. Tarsi with robust setae. Petiole and gaster pubescent with sparse erect and suberect thick light brown long and medium hairs.

Mandible black or reddish black. Body black. Coxae black or reddish black.

Measurements: Syntypus: HW: 2.88mm; HL: 3.21mm; CI: 90; CD: 0.24mm; SL: 2.88mm; EL: 0.60mm; REL: 21.05; WL: 4.52mm; PnW: 1.82mm; TL: 2.85mm; NW: 1.73mm; NL: 1.42mm; Pell: 121; PPL: 2.09mm.

Workers n= 3: HW: 2.82 – 2.88mm; HL: 3.12 – 3.21mm; CI: 89 – 92; CD: 0.24 – 0.30mm; SL: 2.73 – 2.88mm; EL: 0.54 – 0.60mm; REL: 19.35 – 21.05; WL: 4.38 – 4.52mm; PnW: 1.69 – 1.82mm; TL: 2.51 – 2.45mm; NW: 1.63 – 1.72mm; NL: 1.39 – 1.42mm; Pell: 117 – 122; PPL: 1.97 – 2.09mm.

Similar species: *Pachycondyla inca* belongs to the *impressa* species group.

It differs from *P. impressa* by the clypeus size. *Pachycondyla impressa* presents a very short (CD = 0.12mm) clypeus, with a conspicuous median concavity on the anterior clypeal margin, in frontal view, whereas *P. inca* presents a larger clypeus (CD > 0.24mm), with a straight anterior medial clypeal margin, without a concavity.

Pachycondyla inca has striate dorsal mandible sculpturing in contrast with the smooth *P. purpurascens* mandible. It also have thick light brown hairs through the body, which is yellow and thin in *P. purpurascens*.

See the discussion for [P. impressa](#) similar species for differentiation *P. inca* from *P. fuscoatra* and *Pachycondyla* sp. n. The same features used to distinguish *P. impressa* from these species are applicable to *P. inca*.

Distribution: The only record for this species in Brazil is from the type of *P. fuscoatra* cearensis. All other examined samples come from Peru.

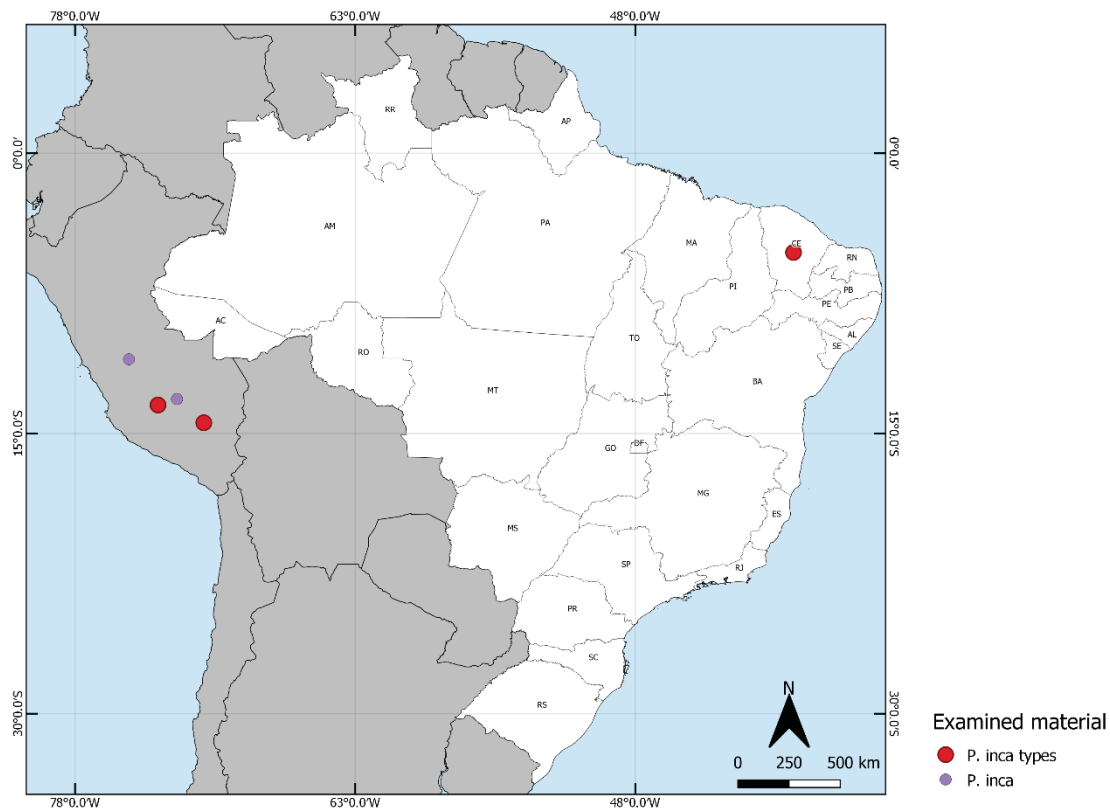


Fig 32- Examined material distribution map and type material locality of *P. inca*.

Discussion: We were not able to examine any sample from Brazil, besides high-resolution pictures from *P. fuscoatra cearensis* type. We did examine a syntype of this species, from Peru, Ocobamba, and were not able to find differences in this specimen from the high-resolution pictures of *P. cearensis* types ([CASENT0907247](#), photography by Will Ericson) available on internet. The distribution of this species is particularly strange. *P. fuscoatra cearensis* was synonymized with *P. inca* by MacKay & MacKay, 2010.

Morphologically this synonymy seems to be valid but regarding to species distribution it is quite questionable. Many collections and expeditions have been made in Amazonas, Pará and Maranhão (Pereira et al., 2016; Souza et al., 2018; Do Prado et al., 2019), and we were able to examine samples from throughout all Brazil and we were not able to find a single specimen of this species. We are inclined to believe that the lack of specimens from this area reflects a real pattern and not a collection artefact. A careful comparison of the type material of *P. inca* and *P. cearensis* is necessary, perhaps permitting to revive *P. cearensis* from synonymy. Since we were not able to examine *P. cearensis* types personally, we will not incur in formal taxonomic changes.

It is extremely improbable that the specimens from Ceará belongs to the same species as the specimens from Peru, due to its distribution.

The biology of *P. inca* is unknown.

Examined material: n = 6: PERU: 3 gynes, base Macho Pichu, Torentoy Canyon, [13°09'47.1"S] [72°32'41.9"W], 22.vi.1954, (B. Malkin) [MZSP]; 1 worker, Macho Pichu, [13°09'47.1"S] [72°32'41.9"W], 26.xi.1965, (without collector) [MZSP]; 1 worker, Valle Chanchamayo, [11°02'02.0"S] [75°06'59.3"W], 07.viii.1957, (Weyrauch) [MZSP].

3.9- *Pachycondyla lenis* Kempf, 1961

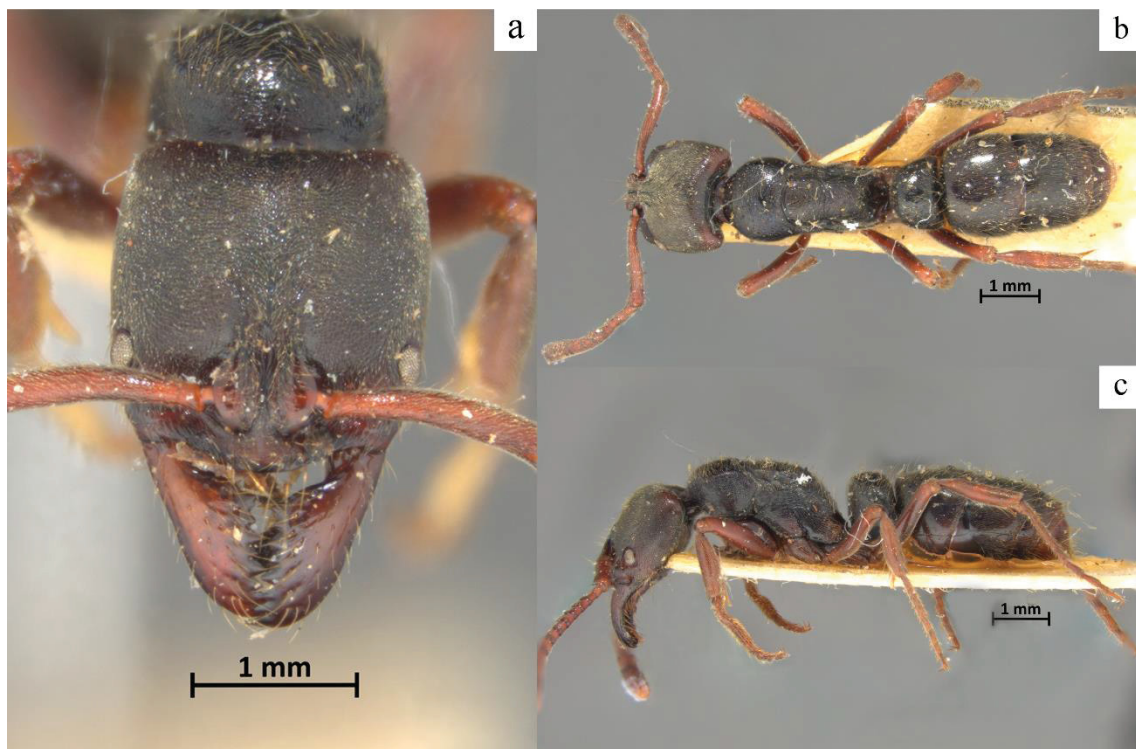


Fig 33: *Pachycondyla lenis* (lectotype DZUP 548860). a: head in frontal view. b: full body in dorsal view; c: full body in lateral view.

Taxonomic history: *Pachycondyla lenis* Kempf, 1961: p.197. Holotype worker BRAZIL, Rio de Janeiro, Petrópolis, 1944 (*Kempf*); one Paratype worker and one gyne same data; Two paratype workers BRAZIL, Paraná, Rio Azul, x.1954 (*F. Plaumann*); Paratype gyne BRAZIL, Rio de Janeiro, Petrópolis, x.1918 (*Borgmeier*); Paratype worker BRAZIL, Rio de Janeiro, Petrópolis, 27.viii.1944 (*Kempf*); Paratype worker BRAZIL, Rio de Janeiro, Petrópolis, ix.1944 (*Kempf*); Paratype worker BRAZIL, São Paulo, Alto

da Serra [Paranapiacaba, Santo André], 26.v.1957 (*Kempf & Santos*); Four paratype workers BRAZIL, São Paulo, Guapiara, 6.iii.1958 (*K. Lenko*) [MZSP]. [examined]

Worker diagnosis: The following suit of characters diagnoses this species:

- 1- Small body size (< 10 mm).
- 2- Absence of shining sharp humeral carina.
- 3- Shining body integument with punctures.
- 4- Longitudinal central carina on clypeus.

Worker description: Mandible with nine teeth along masticatory margin, four intercalary smaller teeth between five larger teeth; dorsum smooth and shiny with sparse piligerous punctures. Head subquadrate in full-face view, with nearly parallel straight to weakly convex lateral margin and concave posterior margin. Clypeal anteromedian margin broadly convex, clypeal medial area with longitudinal carina. Dorsal malar area longitudinally striate. Frons with posteriorly diverging strigate-reticulæ, vertex and gena punctate-reticulate. Ventral head surface medially smooth and shining on center, longitudinally reticulate-striate on sides. Scape densely punctulate, reaching vertex when stretched posteriorly.

Pronotal dorsal margin convex in lateral view, mesonotal-propodeal margin weakly convex to straight, declivitous propodeal margin straight to weakly concave, with broad convexity slightly posterior to propodeal spiracle. Humeral carina shaped as longitudinal blunt ridge, not overhanging pronotal side; pronotal anterior face transversely striate-punctulate, striae extending longitudinally to lateral pronotal face; dorsal face with anteriorly convex reticulate-punctae, posteromedially effaced. Propleuron with sparse piligerous punctures. Mesonotum mostly longitudinally reticulate-punctate, punctae larger on mesonotal disc, propodeal dorsum punctulate.

Mesopleural sulcus developed, anepisternum obliquely to longitudinally striate, katepisternum mostly longitudinally striate with some transverse striae next to mesopleural sulcus. Metapleuron dorsoanteriorly striate, posteriorly with fine piligerous punctures, rugulose close to bulla.

Propodeal declivity separated from lateral face by blunt angle, without crest or carina, mostly smooth with sparse piligerous punctures; lateral surface with longitudinal

striation anteriorly, reticulate-punctate posteriorly; length of dorsal margin in lateral view subequal to declivitous margin.

Petiolar node shaped as rounded trapezoid in dorsal view, broader than long, anterior margin broadly convex, narrower than posterior margin, lateral margin weakly convex, posterior margin weakly concave; higher than long in lateral view; anterior margin straight to weakly convex, dorsal margin convex, posterior margin subparallel to anterior margin with ventral posteriorly projecting broad lobe. Coriaceous punctate on anterior and lateral surfaces, dorsal surface smooth and shiny, with piligerous punctures, smooth and shiny on posterior surface. Subpetiolar process subrectangular in lateral view, anterior margin longer than posterior margin; anterior margin mostly straight with ventral tooth, ventral margin mostly straight with irregularities, posterior margin weakly concave; process transversely striate. Ventral view ovoid with anterior face shaped as elongate smooth and shining lobe.

Gaster shining with dense piligerous punctulae, tergal punctulae increasing in diameter towards posterior segments, sternal punctulae remain equal sized except for punctae on posterior hypopigium; anterior margin of abdominal tergite III vertical and straight in lateral view, forming right angle with dorsal margin; prora small, almost absent, semicircular. Pygidium laterally punctate, posteromedially flattened, smooth and shining weakly convex in lateral view.

Mandible with sparse hairs on dorsum and one row of decumbent hairs along masticatory margin. Clypeal medial area without hairs, anterior margin with long yellow setae, reaching third or fourth mandibular tooth. Head pubescent with sparse medium erect hairs on dorsum. Ventral surface with anteriorly pointed suberect hairs, central area with sparse to almost no pubescence.

Mesosoma with abundant subdecumbent pubescence, with sparse, erect yellow hairs. Procoxa pubescent with long yellow hairs anteriorly and short hairs posteriorly. Sparse fine small hairs all along profemur ventral side. Protibia with one stout apical seta, ventral apex and probasitarsus with dense pale yellow pilosity; other protarsal segments with robust setae. Mid and hind legs with fine pubescence and sparse yellow hairs on ventral side of coxae, femora and tibiae; five stout setae on mesotibia apex and one on metatibia apex. Tarsi with robust setae. Petiole and gaster finely pubescent with sparse erect yellow long and medium hairs.

Mandible ferruginous. Clypeus reddish black. Antennae ferruginous. Body black. Legs brown to reddish black. Pygidium brown to reddish black.

Measurements: Paratypes n = 2: HW: 1.88 – 1.91mm; HL: 1.95 – 2.00mm; CI: 96; CD: 0.16mm; SL: 1.63 – .67mm; EL: 0.32 – 0.37mm; REL: 17.39 – 19.14; WL: 2.94 – 2.98mm; PnW: 1.39 – 1.47mm; TL: 1.55mm; NW: 1.22 – 1.26mm; NL: 0.82 – 0.86mm; Pell: 143 – 155; PPL: 1.39mm.

Workers n = 4: HW: 1.84 – 1.91mm; HL: 1.95 – 2.00mm; CI: 92 – 96; CD: 0.12 – 0.16mm; SL: 1.63 – 1.67mm; EL: 0.32 – 0.37mm; REL: 17.39 – 20; WL: 2.90 – 2.98mm; PnW: 1.22 – 1.47mm; TL: 1.51 – 1.55mm; NW: 1.22 – 1.26mm; NL: 0.82 – 0.86mm; Pell: 143 – 155; PPL: 1.35 – 1.39mm.

Similar species: This species is very similar to *P. harpax*. The difference between them is the presence of a clypeal carina on *P. lenis* and absence of it in *P. harpax*. The general body sculpturing also differs from one species to other. *P. lenis* presents a punctate and shining pronotum, while in *P. harpax* it is matte and striate. The corner between dorsal and lateral petiolar faces of *P. lenis* is less evident than in *P. harpax* and the posterior margin of petiole, in lateral view, presents stronger convexity in *P. harpax* than in *P. lenis*.

Distribution: Occurs from Paraíba (northern and eastern limits) to Santa Catarina (southern limit) and western Paraná (western limit). It is mostly from the Atlantic Forest, from sea level to 900m.

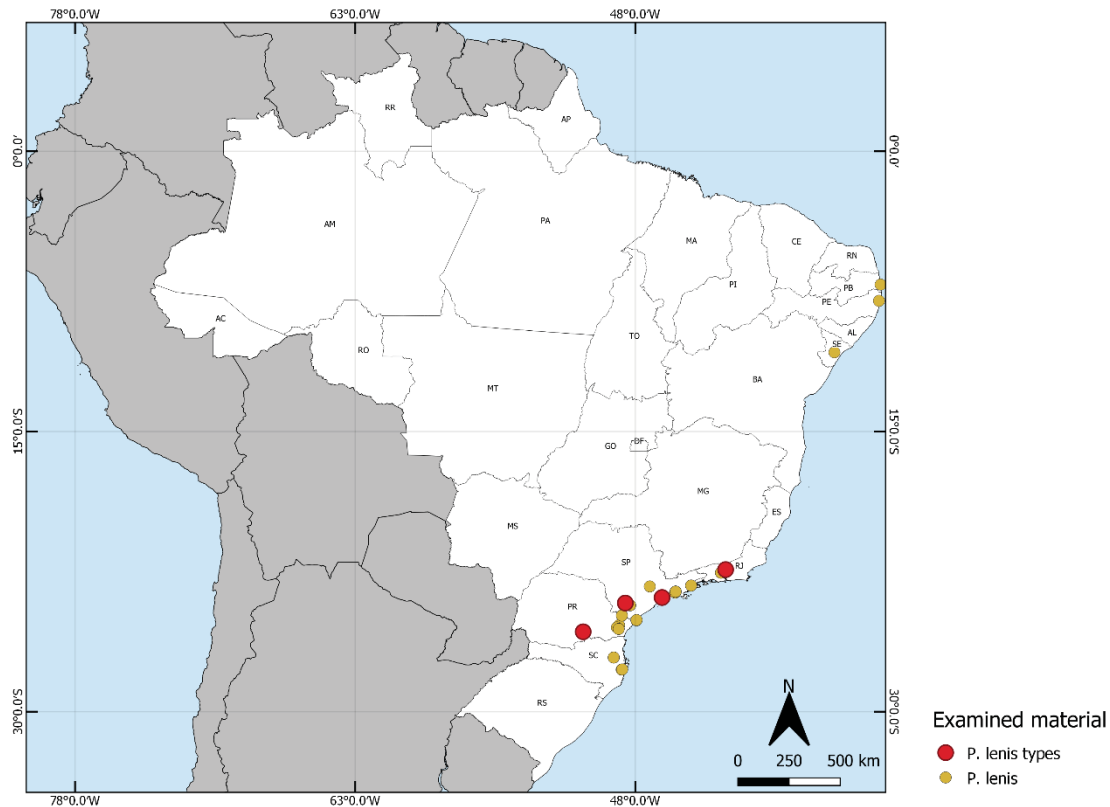


Fig 34- Examined material distribution map and type material locality of *P. lenis*.

Discussion: In the original description, Kempf (1961) masterfully distinguish *P. lenis* from *P. harpax*. We were able to examine the type series of *P. lenis* and could not find other features that distinguished these two species besides the subpetiolar process. In the posterior corner of the subpetiolar process can vary from angular to bluntly angular, in contrast with the swollen rounded posterior corner of *P. harpax*. He comments on the development of humeral carina being absent in *P. lenis* and present in *P. harpax*, but during this study, we were able to observe a large number of *P. harpax* without developed humeral carina.

Little is known about this species: one published work records *P. lenis* on northern states (Paraíba and Pernambuco) than its type locality (Silva & Brandão, 2014). Two nests containing 13-14 workers, 13 immatures and no gyne or winged males were found in twigs of a Fabaceae tree, *Alzibio niopoides* in the leaf-litter (da Silva et al., 2016). It is uncommon to find published records of this species probably because of misidentification as *P. harpax*. Many specimens of this species were found amongst samples of *P. harpax*.

Examined material: n = 65: BRAZIL: **Paraíba:** 3 workers, João Pessoa, Mata do Buraquinho, 07°08'24,7"S 34°51'33,2"W, 25.vii-02.viii.2002, (Silva, R. R. & Eberhardt,

F.) [MZSP]. **Paraná:** 1 worker, Morretes, Estrada da Graciosa, [25°22'21"S] [48°52'09"W], 14.xii.2013, (Feitosa, R. et al.) [DZUP]; 1 worker, Morretes, Parque Estadual do Pau-Ôco, 25°34'33,5"S 48°53'19,5"W, 06-11.v.2002, (Silvar, R. R. & Dietz, B. H.) [MZSP]; 1 worker, Piraquara, Mananciais da Serra, 25°29'45.5"S 48°58'58.2"W, 14.xi.2002, (Garcia, E. Q.), Coleta Manual, [DZUP]; 4 workers, Tunas, Parque das Lauráceas, 24°51'16"S 48°43'00,4"W, 21-29.ii.2001, (Silva & Eberhardt) [MZSP]; 1 worker, Tunas, Parque das Lauráceas, 24°51'16"S 48°43'00"W, 21-29.ii.2001, (Silva & Eberhardt) [MZSP]. **Pernambuco:** 1 worker, Recife, Horto Dois Irmãos, 08°00'32"S 34°56'40"W, 15-24.vii.2002, (Silva, R. R. & Eberhardt, F.) [MZSP]. **Rio de Janeiro:** 4 workers, Nova Iguaçu, ReBIO Tinguá, [22°33'47.9"S] [43°24'36.7"W], 02.ii.2002, (without collector) [MZSP]; 1 worker, Petropolis, Tr. De Fátima, [22°31'27.5"S] [43°10'16.5"W], 20-30.x.1982, (Brandão & Diniz) [MZSP]. **Santa Catarina:** 1 worker, Blumenau, P. E. Nascentes, 27°06'15"S 49°09'14"W, 20-27.x.2000, (Silvar, R. R. & Eberhardt, F.) [MZSP]; 1 worker, Nova Teutonia, [27°11'S] [52°23'W], iv.1984, (Fritz Plaumann) [MZSP]; 1 worker, Palhoça, P. E. Serra do Tabuleiro, 27°44'28"S 48°41'50"W, 02-10.vi.2003, (Silva, R. R., Dietz, B.H. & Tavares, A.) [MZSP]. **São Paulo:** 1 worker, Cananéia, P. E. Ilha do Cardoso, 25°05'48,7"S 47°55'47,3"W, 24-28.xi.2002, (Silva, R. R., Brandão, C. R. F. & Scott, C.) [MZSP]; 1 worker, Cunha, P. E. Serra do Mar, 23°15'03"S 45°00'26"W, 21-22.iv.2001, (A. A. Tavares, R. R. Silva) [MZSP]; 2 workers, Ribeirão Grande, P. E. Intervalles, Base da Barra Grande, [24°18'32.0"S] [48°16'25.4"W], 05.ii.1999, (Tavares, A. A.) [MZSP]; 1 worker, Salesópolis, Est. Biol. Boraceia, 18.x.1950, (K. Lenko) [DZUP]; 1 worker, Salesópolis, E. B. B., [23°34'34.5"S] [45°50'15.2"W], 12-17.vi.1997, (B. H. Dietz & C. I. Yamamoto) [MZSP]; 15 workers, Salesópolis, Est. Biol. Boraceia, [23°34'34.5"S] [45°50'15.2"W], 1.ii.1961, (K. Lenko) [MZSP]; 3 workers, Ubatuba, PE. Serra do Mar, N. Picinguaba, 23°17'56,40"S 44°47'13,20"W, 03-14.iii.2008, (Esteves, F. A. & Feitosa, R. M.) [MZSP]. **Sergipe:** 9 workers, Areia Branca, E. E. da Serra de Itabaiana, 10°45'54"S 37°19'57,4"W, 19-25.v.2003, (Silva R. R., Dietz, B. H & Ferreira, L. S.) [MZSP].

3.10- *Pachycondyla lenkoi* Kempf, 1962.

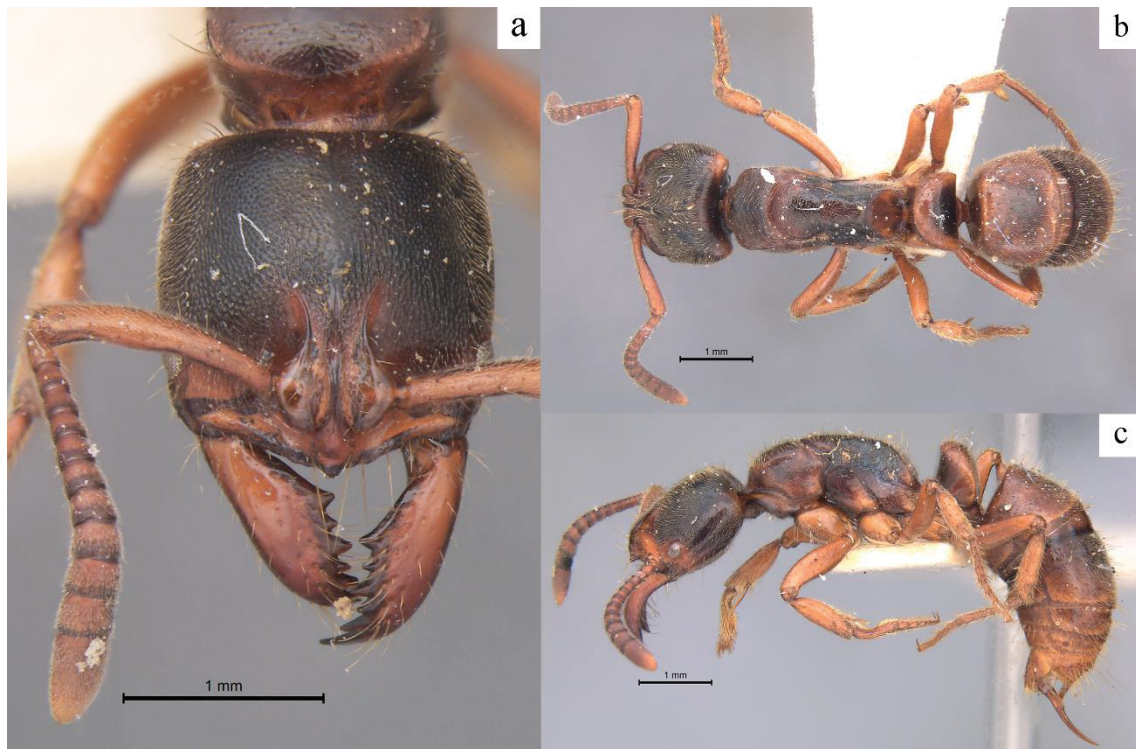


Fig 35: *Pachycondyla lenkoi* (holotype [MZSP]). a: head in frontal view. b: full body in dorsal view; c: full body in lateral view.

Taxonomic history: *Pachycondyla lenkoi* Kempf, 1962b: p. 4. Holotype worker BRAZIL, Mato Grosso, Rio Sacre, 06.viii.1961 (*K. Lenko*) [MZSP] [examined]

Worker diagnosis: The following suite of characters diagnoses this species:

- 1- Mandible triangular to elongate triangular.
- 2- Mandible with seven teeth.
- 3- Projecting tooth centrally on anterior clypeal margin.
- 4- Small Relative Eye Size (REL: 11.54 – 14).
- 5- Petiole narrowed antero-posteriorly in lateral and dorsal view.
- 6- Anterior margin of gastral segment I dorsoanteriorly inclined, in lateral view.

Worker description: Mandible with seven teeth along masticatory margin, three intercalary smaller teeth between four larger teeth; dorsum mostly smooth and shining with sparse piligerous punctures. Basal mandibular margin convex.

Head subquadrate in full-face view, lateral margins weakly converging posteriorly, posterior margin weakly concave. Clypeal anteromedian margin convex with median clypeal process projecting anteriorly as brief lobe.

Dorsal malar area longitudinally striate, laterally rugulose-lacunose. Frons mostly striate-reticulate, becoming rolls of punctures close to vertexal margin, with smooth central line, from frontal lobes to vertex. Vertex mostly smooth and shining with piligerous punctulae. Ventral surface of head smooth and shining with sparse piligerous punctures. Scape shining, with piligerous punctures, reaching vertex but not surpassing it when stretched posteriorly.

Mesosomal dorsal margin straight in lateral view, propodeal declivitous margin weakly convex. Humeral carina developed and overhanging pronotal side; pronotum shining with piligerous punctures in dorsal and lateral views. Propleuron with piligerous punctures. Mesonotum sculpturing equal to pronotum in dorsal view. Mesopleural sulcus not visible, anepisternum longitudinally striate, katepisternum smooth and shining. Metapleuron anteriorly striate, posteriorly with fine piligerous punctures. Propodeal dorsal surface smooth and shining with sparse punctulae. Propodeal declivity anteriorly sparsely punctate, posteriorly smooth and shining, laterally bound by low, broadly convex crest; lateral surface longitudinally striate anteriorly, shining with piligerous punctures posteriorly; length of dorsal margin in lateral view equal to declivitous margin.

Petiolar node wider than long, in dorsal view, anterolateral margin convex, posterior margin straight; almost two times higher than long in lateral view, anterior margin straight, posterior margin convex, forming narrow convex dorsal margin; node mostly shining with piligerous punctures. Subpetiolar process anteriorly projected, subquadrate with brief anterior concavity and straight anteroventral margin that projects ventrally as triangular tooth, posteroventral margin long and mostly concave, curving onto sternum.

Gaster shining with piligerous punctures; anterior margin of abdominal tergite III slightly antero-dorsally oblique in lateral view, forming slight acute angle with dorsal margin. Prora same size as metatrochanter, triangular shaped in lateral view with anterior margin straight, ventrally pointed tip. Pygidium laterally punctate, dorsomedially flattened, smooth and shining.

Mandible with sparse hairs on dorsum and two parallel rows of decumbent hairs along masticatory margin. Clypeal medial area without hairs, anterior margin with long yellow hairs, reaching second or third mandibular tooth. Head pubescent with sparse

suberect or subdecumbent, anteriorly pointed medium hairs on dorsal and ventral surfaces.

Mesosoma sparsely pubescent with sparse, erect yellow medium hairs. Procoxa pubescent with long subdecumbent yellow hairs anteriorly and short hairs posteriorly. Sparse fine erect hairs all along profemur. Protibia with one stout apical setae, ventral apex and probasitarsus with slightly denser pilosity than basal protibia; other protarsal segments with robust setae. Mid and hind legs with fine pubescence and sparse suberect yellow medium hairs on ventral side of coxae, femora and tibiae; six stout setae on mesotibia apex and one on metatibia apex. Tarsi with robust setae. Petiole and gaster finely pubescent with sparse erect yellow medium hairs.

Mandible ferruginous. Body ferruginous with center of sclerites reddish black or black.

Gyne description: Mandible with seven teeth along masticatory margin, three intercalary smaller teeth between four larger teeth; dorsum with sparse piligerous punctures, smooth and partially shining. Head subquadrate in full-face view, with almost parallel lateral margins converging posteriorly and straight posterior cephalic margin. Clypeal anteromedian margin with a projection, clypeal medial area smooth and shining. Dorsal malar area longitudinally striate. Frons strongly striate-reticulate, ocelli separate from each other by three diameters. Ventral surface of head punctate laterally and shining with sparse piligerous centrally. Scape shining, with piligerous punctures, reaching vertex, not surpassing it when stretched posteriorly.

Mesosomal dorsal margin almost flat in lateral view, with sharp edges on propodeal declivitous margin. Humeral carina well developed overhanging pronotal side; pronotal dorsum punctate smooth and shining centrally, lateral pronotal surface longitudinally substrigulate. Propleuron with piligerous punctulae. Mesonotum shining and punctate in dorsal view. Mesoscutum wide and flat, shining and punctate, parapsidal lines visible. Scutoscuteellar sulcus narrow with longitudinal weakly developed costulae between axilla and mesoscutellar disc; Axilla punctate and axillula longitudinally weakly costate. Mesoscutellar disc punctate and shining. Mesopleural sulcus well developed and visible; metascutellar trough punctate; mesometapleuron and lateral propodeal face difficult to see due to liquid fat on specimen.

Propodeal, petiolar and gastral shape and integument sculpturing, identical to workers. Pubescence and body color identical to workers.

Measurements: Holotype: HW: 1.57mm; HL: 1.69mm; CI: 93; CD: 0.18mm; SL: 1.21mm; EL: 0.18mm; REL: 11.54; WL: 2.33mm; PnW: 1.09mm; TL: 1.12mm; NW: 1.03mm; NL: 0.60mm; Pell: 170; PPL: 1.09mm.

Non-type material: Worker (n = 7): HW: 1.51 – 1.75mm; HL: 1.64 – 1.84mm; CI: 93 – 98; CD: 0.15 – 0.20mm; SL: 1.21 – 1.39mm; EL: 0.18 – 0.24mm; REL: 11.54 – 14.00; WL: 2.27 – 2.65mm; PnW: 1.03 – 1.26mm; TL: 1.09 – 1.22mm; NW: 0.94 – 1.10mm; NL: 0.48 – 0.69mm; Pell: 159 – 194; PPL: 1.09 – 1.26mm.

Similar species: *Pachycondyla lenkoi* presents body size similarities with *P. harpax* and *P. lenis*, but it is distinguishable from both species by a tooth-like projection on the anteromedian clypeal margin. The general body color is ferruginous or dark brown in *P. lenkoi*, but black in *P. harpax* and *P. lenis*.

The petiole shape is narrower in *P. lenkoi* (Pell: 159 – 194) than in *P. harpax* (Pell: 154 – 182) and *P. lenis* (Pell: 143 – 155) in dorsal view.

The sculpturing in *P. lenkoi* is almost shining, with punctures throughout the body, while in *P. harpax* generally presents striae on the frons and dorsal mesosoma. *Pachycondyla lenis* presents punctures on dorsal mesosoma but *P. lenkoi* punctures are more scattered than *P. lenis*. The humeral angle is greatly developed, elevated and overhanging pronotal sides, in *P. lenkoi*, which is not in *P. lenis* nor in *P. harpax*, despite *P. harpax* can present developed humeral carina, but not elevated or overhanging pronotal sides.

Distribution: Occurs from Tocantins (northern limit) to Minas Gerais (southern and eastern limits) and Mato Grosso (western limit). Species only known from the Cerrado biome.

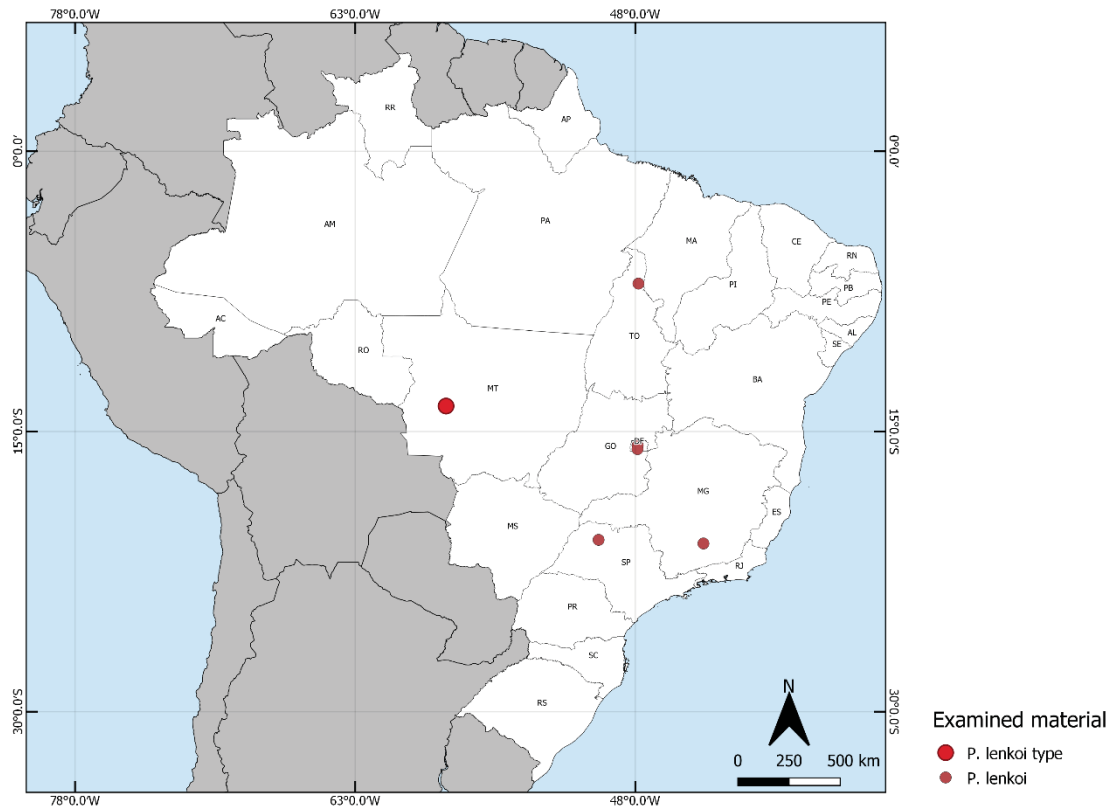


Fig 36- Examined material distribution map and type material locality of *P. lenkoi*.

Discussion: This is the *Pachycondyla* species with the smallest relative eye length (REL). Other species present a REL of 18 – 21 while *P. lenkoi* presents a REL of 12 - 14. Visually this translates into a small eye (0.18 – 0.24mm), located anteriorly, in dorsal view of the head with a posterior ocular margin that is far from reaching the frontal carina posterior limit (more than one ocular length). Other *Pachycondyla* have eyes that reach or almost reach the posterior limit of the frontal carina but never surpasses it. *Pachycondyla lenkoi* have seven mandibular teeth, the lesser number of teeth among *Pachycondyla*.

The dorsal pronotal surface of *P. lenkoi* is flattened, while it is commonly broadly convex in other *Pachycondyla* species. The metanotal groove is weakly impressed as series of punctulae in *P. lenkoi*, which differs from other *Pachycondyla*. The metanotal suture in species of the genus is like a weak depression, noticeable only with some specific incident light angles, never changing sculpturing or interrupting it. The anterior propodeal lateral margins of *P. lenkoi* are different from other *Pachycondyla*, it seems to be pinched inwards, in dorsal view, while in other species these margins are continuous with mesonotal lateral margins.

Pachycondyla lenkoi also have the narrowest petiole of *Pachycondyla*, almost not forming a dorsal surface and lacks the stout setae on the hypopigial dorsoposterior margin.

In MacKay & MacKay (2010) this species is hesitantly placed in the *stigma* species complex, regardless of its carinate humeral angle, slit shaped propodeal spiracle, and lack of depressed metanotal suture. Species of the *stigma* complex do not have developed carina on humeral angle, they have circular propodeal spiracles and also have depressed mesosoma on metanotal suture. They suggest that *P. lenkoi* is a bridge between the *stigma* and *ferruginea* complexes (MacKay & MacKay, 2010). The *stigma* complex eventually became *Pseudoponera* and the *ferruginea* complex became *Rasopone* (Schmidt & Shattuck, 2014). The possibility of placing *P. lenkoi* in the *crassinoda* species complex was not mentioned. Schmidt & Shattuck (2014) included *P. lenkoi* in *Pachycondyla*. It seems that the inclusion in the genus is due to its description as *Pachycondyla* (Kempf, 1962) by the author of the revision with closest concept of true *Pachycondyla* to the modern one.

Maybe *P. lenkoi* is not a representative of *Pachycondyla* but of some other lineage. It does present the majority of diagnostic characters of *Pachycondyla* but some morphological features diverge from the overall morphology of the genus such as those mentioned above. Molecular phylogenetic analyses should demonstrate the relation of *P. lenkoi* with other *Pachycondyla* species or with other genera.

It is an uncommon species, as only nine samples were available to examine. One gyne was found in MZSP, the gyne of this species is the only one within gynes of *Pachycondyla* with observable differences from workers besides the mesosomal modifications for wing musculature. The eyes of the gyne are larger than those of workers, having a REL similar to other *Pachycondyla* (REL = 23,25). The sculpturing on the frons of gyne is more developed than in the workers. Besides these minor differences, the gyne is readily identifiable as *P. lenkoi*. All other *Pachycondyla* gynes have eyes with same proportions as the workers, such as sculpturing equal to workers.

Examined material: n = 9: BRAZIL: **Distrito Federal:** 1 worker, Brasília, UNB – Campus, [15°44'49.3"S] [47°52'22.2"W], 25.v.1977, (Diniz & Megrett) [DZUP]; 2 worker, Brasília, Campus UnB, [15°45'47.0"S] [47°52'14.6"W], 12.x.1975, (J. Diniz) [MZSP]; 1 worker, Brasília, Reserva Ecol. IBGE., [15°56'53.3"S] [47°52'42.5"W],

06.ii.2008, (J. Maravalhas) [MZSP]. **Minas Gerais**: 1 worker, Ritópolis, 21°00'00.73"S 44°20'52.10"W, Pitfall Epigéico, UFV LABECOL n° 000002, ii.2012, (M. Padilha) [UFV]. **São Paulo**: 2 workers, Macaubal, Faz. Sta. Barbara, [20°48'22.2"S] [49°57'49.2"W], 19.ix.1971, (Diniz, J. L. M.) [DZUP]. **Tocantins**: 1 gyne, Babaçulândia, 07°05'16,3"S 47°49'43,1"W, 10-15.xii.2001, (Albuquerque & Silva) [MZSP].

3.11- *Pachycondyla purpurascens* Forel, 1899.

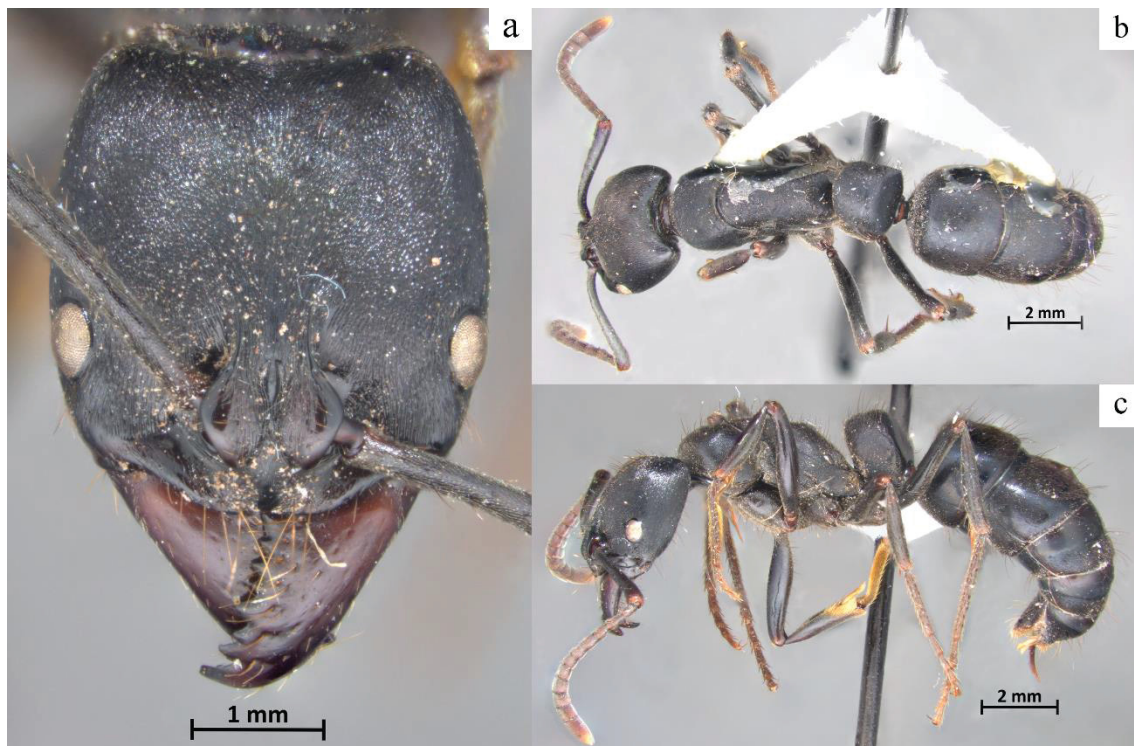


Fig 37: *Pachycondyla purpurascens* (DZUP 548861). a: head in frontal view. b: full body in dorsal view; c: full body in lateral view.

Taxonomic history: *Pachycondyla purpurascens* Forel, 1899: p.12. Syntype worker COSTA RICA, Cache (*H. Roger*) [BMNH]. [high resolution images examined ([CASENT0902515](#), photography by Will Ericson)].; Lectotype worker COSTA RICA, Cache (*H. Rogers*) [MHNG]. [high resolution images examined ([CASENT0907248](#), photography by Will Ericson)]. [Subspecies of *fuscoatra*: Emery, 1901. p.45] [Junior synonym of *impressa*: Kempf, 1961e. p. 195] [Revived from synonymy: MacKay & MacKay, 2010. p. 489]

Worker diagnosis: The following suit of characters diagnoses this species:

- 1- Large body size (> 10 mm).

- 2- Mandible without striae on its dorsum.
- 3- Clypeal distance bigger than antennal scape width.
- 4- Anteromedian clypeal margin without strong concavity.
- 5- Humeral angle does not overhang lateral pronotal face.
- 6- Absence of shining and distinctly elevated humeral carina.
- 7- Propodeal declivitous margin without low lateral expansions.
- 8- Petiole dorsum and posterior face transversely striate.

Worker description: Mandible triangular in dorsal view with nine to ten teeth along masticatory margin, five smaller intercalary teeth present between four to five larger teeth; dorsum without striae, partially shining, with sparse punctae and scattered longitudinal, feeble impressions. Head subquadrate in full-face view, with broadly convex lateral margin and broadly concave posterior cephalic margin. Clypeal anterolateral margin weakly concave. Clypeal anteromedian margin straight to weakly concave, median clypeal area longitudinally elevated, extending posteriorly between frontal lobes, anteriorly smooth, posteriorly finely longitudinally striate. Dorsal malar area longitudinally striate. Frons finely striate, medially longitudinal and diverging posterolaterally. Ventral surface of head laterally mostly longitudinally striate, striae curve around close to hypostoma and postgenal bridge, in U-shaped pattern. Scape surpassing vertex by at least one apical scape width when stretched posteriorly, with piligerous punctulae.

Pronotal margin convex, mesonotal dorsal propodeal margin weakly convex to almost straight, declivitous margin straight, forming blunt obtuse angle with dorsal margin. Humeral carina absent, dorsal surface forms blunt square angle with lateral surface, lateral surface broadly convex; pronotal dorsum transversally striate or anteriorly with transverse striae that curve posteriorly, posteromedially forming U-shaped pattern, lateral pronotal surface obliquely striate. Propleuron longitudinally striate-punctate. Mesonotum longitudinally striate in dorsal view; propodeal dorsum transversely striate. Mesopleural sulcus absent to partially impressed; mesopleuron, anterior metapleuron and lateral propodeum continuously longitudinally strigulate; posterior metapleural surface shining with piligerous punctulae. Propodeal declivity transversally strigulate anteriorly, becoming imbricate posteriorly; length of dorsal margin in lateral view about the same as declivitous margin.

Petiolar node subrectangular in dorsal view, wider than long, anterior margin weakly convex, slightly narrower than posterior margin; higher than long in lateral view; anterior margin straight, slightly anteriorly inclined, posterior margin broadly convex, subparallel with anterior margin; in posterior view pentagonal, widest at mid-height, dorsoposterior margins converging with each other, ventroposterior margins converging with each other. Anterior surface smooth, with piligerous punctures, dorsal surface transversely striate, lateral surface imbricate to finely longitudinally striate and posterior surface transversely finely strigulate. Subpetiolar process roughly subtriangular in lateral view, anterior margin convex, forming posteroventrally projecting tooth; posterior margin broadly convex. Subpetiolar process shape in ventral view elongate pyriform; anterior face smooth and shining, most of process transversely costulate.

Gaster shining; anterior margin of abdominal tergite III vertical and straight in lateral view, forming right angle with dorsal margin; abdominal tergite III mostly imbricate with abundant piligerous punctulae, anterodorsally with short, transverse striae, tergite IV smooth and shining with abundant punctulae, tergites V-VI dorsomedially smooth and shining, laterally with oblique striae, tergite VI more striate than tergite V. Pygidium longitudinally costulate laterally, dorsally anteriorly transversely costulate, shining and slightly flattened posteromedially. Prora smaller than metatrochanter, subtriangular, anterior face straight followed by an oblique concavity, resulting in a ventrally directed point, posterior margin concave; sternites III – IV finely punctate, IV-V mostly smooth and shining with fine imbricate etching, hypopigium with scattered punctae, posterior margin broadly concave, below stinger.

Mandible with sparse hairs on dorsum and two parallel rows of decumbent hairs along masticatory margin. Clypeal medial area without hairs, anterior margin with long yellow setae, reaching third or fourth mandibular tooth. Head with appressed and decumbent pubescence, with sparse erect hairs on dorsal and ventral surfaces. Pubescence sparse anteromedially on ventral head surface.

Mesosoma finely pubescent, with sparse erect yellow hairs. Procoxa pubescent with long erect yellow hairs anteriorly and short erect hairs posteriorly; profemur dorsum without hairs and sparse suberect hairs ventrally. Protibia with one stout apical seta, ventral apex and probasitarsus with dense golden appressed pilosity; other protarsal segments with robust setae ventrally. Mid and hind legs with fine pubescence and sparse suberect yellow hairs on ventral side of coxae, femora and tibiae; five stout setae on

mesotibial apex and five on metatibial apex. Tarsi with robust setae. Petiole and gaster finely pubescent with sparse erect and suberect dark long and medium hairs. Pygidium with posterolateral row of hairs and setae.

Mandible black or reddish black. Body black. Coxae black or reddish black.

Measurements: n = 1: HW: 3.34mm; HL: 3.47mm; CI: 96; CD: 0.24mm; SL: 2.98mm; EL: 0.65mm; REL: 19.51; WL: 4.70mm; PnW: 2.04mm; TL: 2.82mm; NW: 1.84mm; NL: 1.35mm; Pell: 136; PPL: 2.12mm.

Similar species: This species belongs to impressa species group, therefore is very similar to *P. fuscoatra*, *P. impressa*, *P. inca* and *Pachycondyla* sp. n.

For differences between *P. purpurascens* and *P. fuscoatra* see [P. fuscoatra](#) similar species. For differences between *P. purpurascens* and *P. impressa* see [P. impressa](#) similar species. For differences between *P. purpurascens* and *P. inca* see [P. inca](#) similar species.

Distribution: Commonly found in Costa Rica, with records in Venezuela, Ecuador, Peru and Bolivia. The first records from Brazil are from Goiás and Pernambuco. It is possible it occurs in Amazonas, Roraima, Amapá, Pará and Mato Grosso, since these states are between the Andens records and the known Brazilian records.

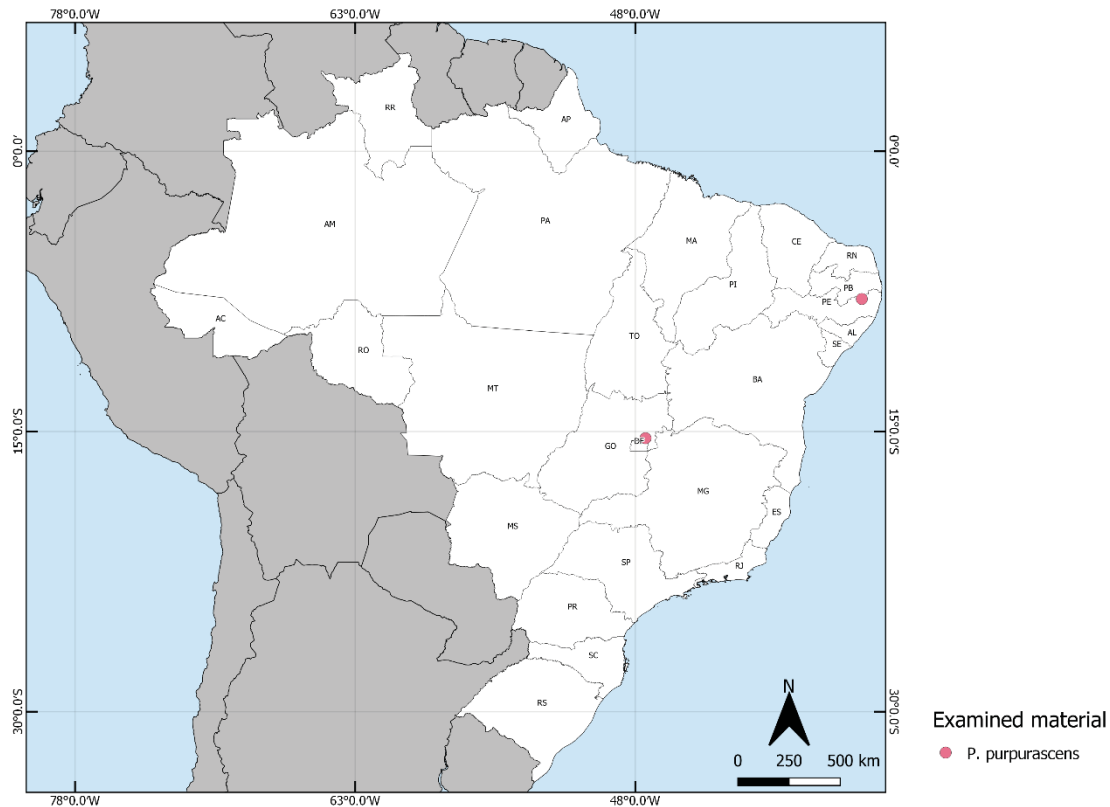


Fig 38 - Examined material distribution map and type material locality of *P. purpurascens*.

Discussion: This is the first record of this species to Brazil, the worker and the gyne examined matches the descriptions provided by MacKay & MacKay (2010), have the clypeal distance longer than antennal scape width and smooth mandibular dorsum, which differentiate these specimens from *P. impressa* and *P. inca*.

It is the second largest species of the genus after *P. crassinoda*. Longino (2010b) reports a worker of *P. purpurascens* from Costa Rica predating a *Gnamptogenys*, in that occasion the worker of *P. purpurascens* showed erratic movements, moving forward and backwards after preying upon the *Gnamptogenys*. He mentions a simple hole shaped entrance to the nest, which had an arm-length depth when excavated.

Examined material: n = 2: BRAZIL: **Goiás:** 1 worker, Itiquira, [15°21'50.8"S] [47°27'03.3"W], 03.i.1976, (A. Negretl) [MZSP]. **Pernambuco:** 1 gyne, Caruaru, [08°11'65.8"S] [36°01'30.3"W], v.1972, (T. Lima) [MZSP].

3.12- *Pachycondyla striata* Smith, 1858.

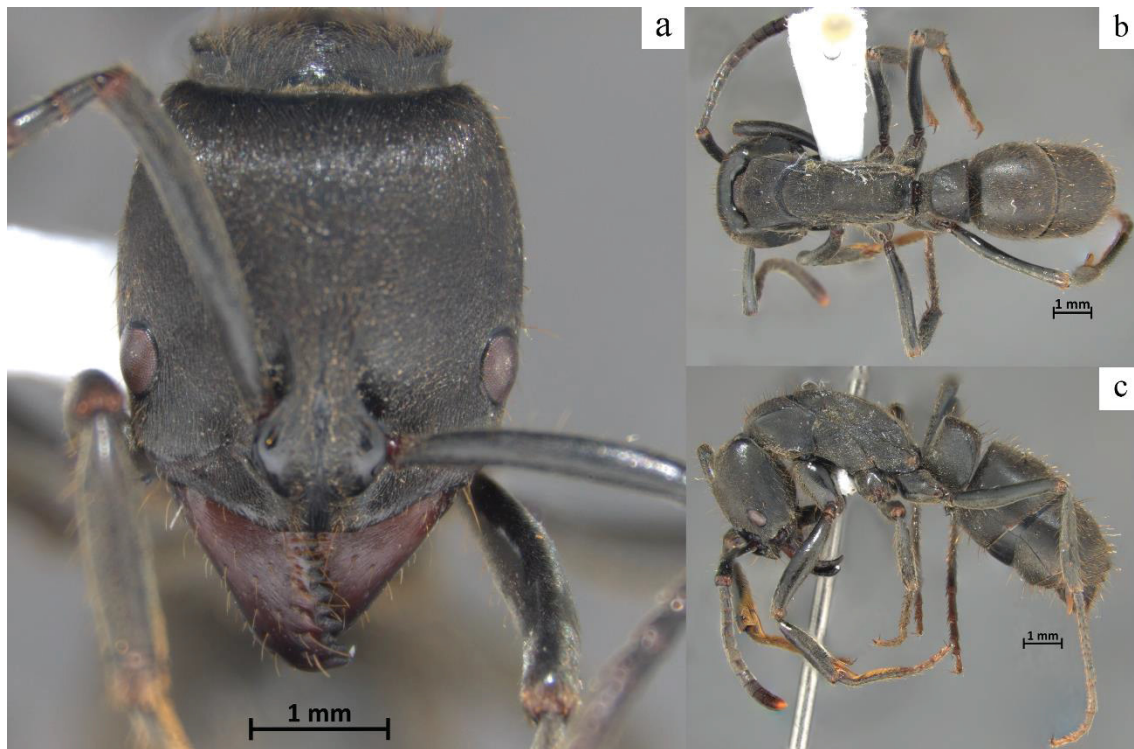


Fig 39: *Pachycondyla striata* (DZUP 548862). a: head in frontal view. b: full body in dorsal view; c: full body in lateral view.

Taxonomic history: *Pachycondyla striata* Smith, 1858: p.106. Syntype worker BRAZIL, Rio de Janeiro (without collector) [BMNH]. [high resolution images examined ([CASENT0902514](#), photography by Will Ericson)]; Syntype worker same data [OUMNH] [high resolution images examined ([CASENT0901359](#), photography by Will Ericson)]

Pachycondyla striata nitidiventris Santschi, 1921: p.87. Syntype worker, URUGUAY, Lat. -32.483334 Long. -53.516666, 31.XII.1914 (*V. Steiger*) [NHMB]. [examined] [Junior synonym of *striata*: Kempf, 1961: p. 201; synonymy confirmed]

Pachycondyla constricticeps MacKay & MacKay, 2010: p.274. Holotype worker ARGENTINA, Misiones, 20k E Wanda, Picada Tirica, 02.i.2008 (*W&E. Mackay*) [IMLA] **Syn. n.**

Worker diagnosis: The following suit of characters diagnoses this species:

- 1- Large body size (> 10 mm).
- 2- Humeral angle overhanging propodeal side.
- 3- Humeral angle with a shining carina.

4- Propodeal declivity with low postero-laterally projecting lobes.

Worker description: Mandible with ten to eleven teeth along masticatory margin, five smaller intercalary teeth present between five to six larger teeth; dorsum with sparse piligerous punctures, smooth at apex, base with strigulae spreading towards masticatory margin. Head subquadrate in full-face view, with broadly convex lateral margin and weakly concave posterior cephalic margin. Clypeal anteromedian margin straight to weakly concave, median clypeal area longitudinally elevated, extending between frontal lobes, finely longitudinally striate on supraclypeal area. Process medially smooth and shining. Dorsal malar area longitudinally striate. Frons striate, longitudinal on center and posteriorly diverging on lateral face. Ventral portion of head with posterolaterally diverging striae, striae variously effaced medially. Scape reaching or surpassing vertex by one apical width when stretched posteriorly, with piligerous punctulae.

Mesosomal dorsal margin smoothly convex in lateral view, propodeal declivitous margin anteriorly straight, posteriorly broadly convex. Humeral carina well developed, smooth, slightly overhanging pronotal side; pronotal dorsum anteriorly with transverse striae that curve posteriorly on sides forming U-shaped pattern, lateral pronotal surface longitudinally striate. Propleuron mostly transversally striate. Mesonotum longitudinally striate in dorsal view; dorsal propodeal face transversally striate. Mesopleural sulcus well developed; mesometapleuron and lateral propodeal face continuously longitudinally striate.

Propodeal declivity laterally bound by low, broadly convex crest; transversally strigate anteriorly, imbricate medially and tending to smooth and shining posteromedially; length of dorsal margin in lateral view about same as declivitous margin.

Petiolar node subtrapezoid in dorsal view, anterior margin convex, narrower than posterior margin; higher than long in lateral view; anterior margin straight, dorsal margin weakly convex and posterior margin broadly convex; anterior surface shining and imbricate with punctulae, dorsal surface anteriorly with transverse striae that curve posteriorly on sides forming U-shaped pattern, lateral surfaces imbricate to finely striate and posterior surface imbricate or striate. Subpetiolar process subtrapezoid, longest base fused to sternite, anterior margin oblique, with brief anterior concavity, medialposteriorly mostly straight, forming ventroposterior projection; ventral margin broadly convex and posterior margin convex forming a round angle, ventrally transversely striate.

Gaster usually matte, sometimes shining; anterior margin of abdominal tergite III vertical and straight in lateral view, forming right angle with dorsal margin; abdominal tergites III-VI densely punctulate. Pygidium with abundant shallow punctae laterally, dorsally mostly smooth and shining, slightly flattened medially. Prora smaller than metatrochanter, resembling brief crest, triangular with anterior margin straight to weakly concave, mostly oblique with small posteriorly curving point. Abdominal sternite III-VI densely punctulate, sternites V-VI medially with punctulae effaced; hypopigium anteriorly imbricate, posteriorly with shallow scattered punctures, posterior margin strongly convex below stinger.

Mandible with sparse hairs on dorsum and two parallel rows of decumbent hairs along masticatory margin. Clypeal medial area without hairs, anterior margin with long yellow setae, reaching third or fourth mandibular tooth. Head with appressed and decumbent pubescence, with sparse erect hairs on dorsal and ventral surfaces. Pubescence sparse anteromedially on ventral head surface.

Mesosoma sparsely pubescent, with sparse erect yellow hairs. Procoxa pubescent with long erect yellow hairs anteriorly and short erect hairs posteriorly; profemur dorsum without hairs and sparse suberect hairs ventrally. Protibia with one stout apical seta, ventral apex and probasitarsus with dense golden appressed pilosity; other protarsal segments with robust setae ventrally. Mid and hind legs with fine pubescence and sparse suberect yellow hairs on ventral side of coxae, femora and tibiae; six to eight stout setae on mesotibial apex and four on metatibial apex. Tarsi with robust setae. Petiole and gaster finely pubescent with sparse erect and suberect yellow long and medium hairs.

Mandible black, reddish black or red. Body black. Coxae black or reddish black.

Measurements: *P. striata nitidiventr*is syntype: HW: 2.57mm; HL: 2.90mm; CI: 89; CD: 0.28mm; SL: 2.65mm; EL: 0.57mm; REL: 22.22; WL: 4.19mm; PnW: 1.59mm; TL: 2.49mm; NW: 1.55mm; NL: 1.02mm; PelI: 152; PPL: 2.04mm.

Non-type material: Worker (n = 60): HW: 2.28 – 3.26mm; HL: 2.49 – 3.45mm; CI: 85 – 96; CD: 0.20 – 0.33mm; SL: 2.45 – 3.02mm; EL: 0.49 – 0.65mm; REL: 18.31 – 23.21; WL: 3.87 – 5.21mm; PnW: 1.39 – 2.12mm; TL: 1.96 – 2.86mm; NW: 1.43 – 2.00mm; NL: 0.98 – 1.39mm; PelI: 122 – 156; (PPL): 1.84 – 2.49mm.

Similar species: *Pachycondyla striata* is very similar in size with *P. impressa* but has a humeral carina which is shining and well developed, lacking in *P. impressa*. *Pachycondyla striata* also has lateral lobes on the propodeal declivity, but absent in *P. impressa*. The petiole in *P. striata* has low postero-lateral expansions, a feature lacking in *P. impressa*.

Specimens of *P. fuscoatra* were commonly found among *P. striata* in the collections we studied. This species is the most similar with *P. striata* and differs principally by its lack of a distinct humeral carina. *Pachycondyla fuscoatra* has a swollen humeral angle, overhanging lateral pronotal face in dorsal view, but it forms a blunt angle instead of a carina. The petiole of *P. fuscoatra* is longer (NL: 1.26 – 1.43) , it has subparallel anterior and posterior margins in lateral view, the posterior margin is slightly convex and lateral face curves onto dorsal face with a square angle. The slightly shorter petiole of *P. striata* (NL: 1.08 – 1.39) does not have subparallel anterior and posterior margins in lateral view, the posterior margin is broadly convex and the lateral face curves onto dorsal face with an acute angle. The gastral sculpturing in *P. striata* is punctulate, matte or shining, while *P. fuscoatra* presents longitudinal strigulae on the gastral tergites.

Some similarities also are seen with *P. harpax*, such as the lateral lobes on propodeal sides, the petiolar shape is the same, but the general body size distinguishes these species readily.

Distribution: Records are from Uruguay, northern Argentina, Bolivia and Paraguay. In Brazil it occurs from Bahia (northern and eastern limits) to Rio Grande do Sul (southern limit) and Mato Grosso (western limit). One record comes from Acre, western than Mato Grosso, however it is the only sample from there we were able to examine. Common species of the Atlantic Forest. Altitude of occurrence ranges from sea level to 1515m.

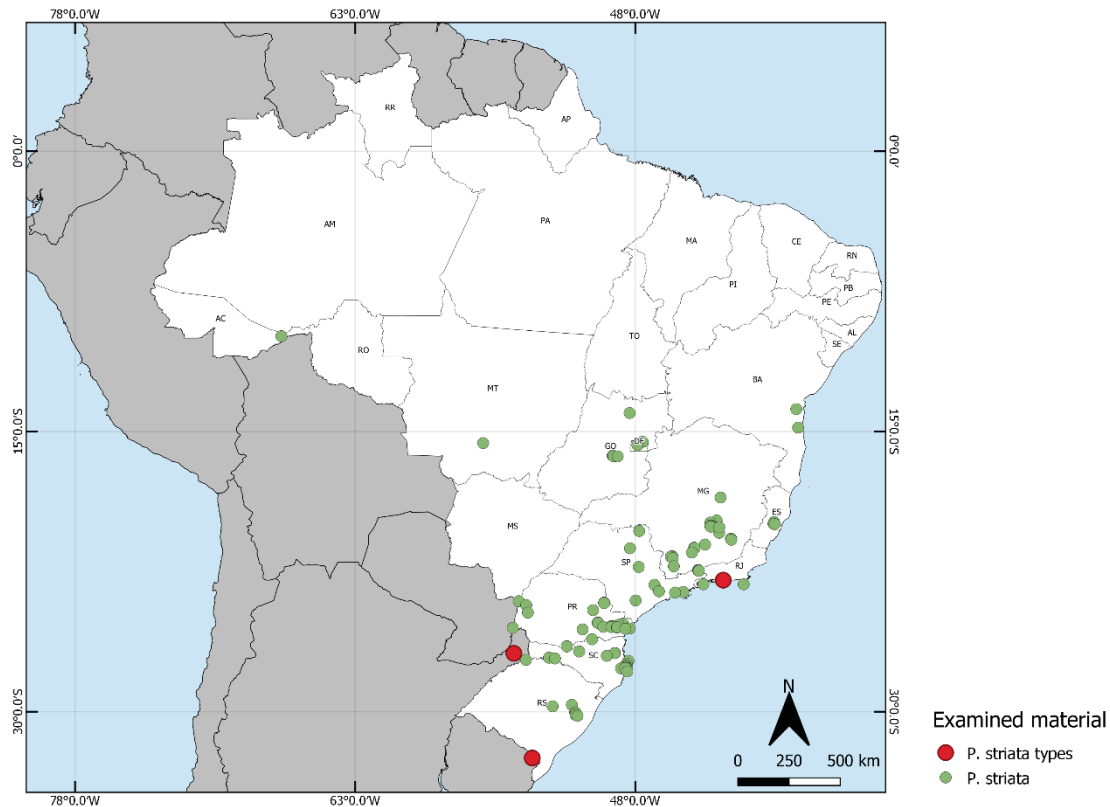


Fig 40- Examined material distribution map and type material locality of *P. striata*.

Discussion: This species seems to be very constant in terms of general morphology. It presents some sculpturing variation however. The ventral head sculpturing varies in the development of the lateral striae; some individuals have them reaching the medial region while in others they stay laterally. Propleuron sculpturing may have more developed striae in some cases while in others they are less developed, or even rugose. The propodeal declivity may presents a posteromedial smooth and shining area, but it can be big or small. The petiolar node lateral surface is generally imbricate to striate, but in some cases, it is shining, finely imbricate and punctate. The greatest variability is in the gastral integument, which may be punctate completely matte to shining. In the past, this variability was used by Santschi (1921) to describe a variety of *P. striata* (*P. striata nitidiventris*), but Kempf (1961) synonymized them, arguing that the overlap on distribution of these two varieties and the continuous nature of this variability does not represent two distinct taxonomic forms but two developmental phases of the same species.

We also found no discrete differences between forms with shining and matte gaster. The only difference that we were able to find between these two morphologies is the general body size of workers. We measured 30 specimens of each morphology, from

all states it occurs. The specimens with matte gaster tends to be bigger, with the highest measurements, while the shining ones presents the smallest measurements but with great overlap between these morphologies. No geographical pattern is observable between these two morphologies and they occur in the same areas, occasionally captured in the same pitfall trap.

The sample from Acre is from a distance of some 800 km west and 300 km north from the closest record. This only specimen is treated as a labelling error. It is conceivable that commerce from southern Brazil, with many agroindustrial, firms, to Acre, with expanding agricultural activity, could offer an opportunity for movement. It is doubtful that *P. striata*, a species of temperate to subtropical latitudes could successfully become established in the heat of Acre.

Pachycondyla striata is one of the most studied *Pachycondyla* species, with venom grand morphological study (Ortiz & Camargo-Mathias, 2003), venom characterization studies (Santos et al., 2017), morphology of ovaries and fat body of workers and queens (Thiele & Camargo-Mathias, 1999, Thiele & Camargo Mathias, 2003) and structural characterization of spermatozoa (Cuquetto-Leite, 2017).

This species presents nests close to the surface, generally near to tree bases or in rotten logs (da Silva-Melo & Giannotti, 2010; Rodrigues, et al, 2011). A mature colony may present up to 80 workers with one queen. One study from Viçosa, Minas Gerais state of Brazil suggests that colonies on its founding stages presents multiple queens and eventually develop into a monogynic mature colony (Rodrigues, et al, 2011). Workers of this species have an average life span of 74 days (da Silva-Melo et al., 2011).

Pachycondyla constricticeps MacKay & MacKay, 2010, is only known by its holotype. MacKay and Macky described this species based on a single worker from Misiones Argentina, with an unusual cephalic constriction. Its distinct head morphology is its only diagnostic character, being equal to *P. striata* in all other aspects. We contacted the Instituto Miguel Lillo regarding the type, supposedly deposited there by MacKay, but it could not be located. During this study we found only one other specimen, from São Paulo, Brazil, that resembled *P. constricticeps*.

Head deformations and a swollen gaster are common in ants parasitized by nematodes (Wheeler, 1928). A swollen gaster is not mentioned in the original description of *P. constricticeps* but is observable on the exemplar we examined.

After examination of this exemplar and comparing it with *P. striata* specimens, we came to the conclusion that these samples represent anomalous conditions not worthy of formal taxonomic status. Interestingly enough, we also came across a worker of *P. harpax* with a similar cephalic constriction, but only on one side. We consider *P. constricticeps* a junior synonym of *P. striata*.

Examined material: n = 322: *P. constricticeps* **n. syn:** [MZSP]: 1 worker, Brasil, São Paulo (SP), Ituverava, [20°20'03.6"S] [47°47'31.9"W], 1911, (E. Garbe).

BRAZIL: **Acre:** 1 worker, Acrelândia, [9°54'24.6"S] [66°57'02.8"W], 15.vii.2001, (Portela, O.) [DZUP]. **Bahia:** 1 worker, Itabuna, Faz. Ditosa, [14°47'48.3"S] [39°16'45.0"W], vii.1919, (E. Garbe) [MZSP]; 1 worker, Pirai do Norte, Serra da Papua, Mata Atlântica, [13°48'27.6"S] [39°22'28.6"W], 10.iv.2010, (Ulysea, M. A.; Medina, A. M.; Lima, I. V.) [DZUP]. **Distrito Federal:** 1 worker, Brasília, Est. Exp. De Biol. (UnB), 15°44'13"S 47°52'56"W, 07.xi.2013, (Moussallem, M.) [DZUP]; 5 workers, Brasília, Mata Pitico, 15°55,797'S 47°52, 586'W, 13-15.xi.2009, (Schmidt, K.) [MZSP]; 1 worker, E. Ecol. Águas Emendadas, [15°33'37.6"S] [47°36'19.0"W], 21.xii.1992, (A. Reis) [MZSP]. **Espírito Santo:** 1 worker, Rebio Augusto Ruschi, Tracomal, -19.851646 - 40.561680, i.2013, (S. Simon) [UFV]; 1 worker, S. Teresa, [19°56'16.9"S] [40°35'42.8"W], v.1928, (O. conde) [MZSP]; 1 worker, Santa Teresa, Estação Biológica Santa Lucia, 19°58'09"S 40°32'15"W, 20-24.i.2002, (Schoereder, J. H. & Ribas, C. R.) [MZSP]. **Goiás:** 3 workers, Anapolis, [16°20'08.3"S] [48°56'27.1"W], 12.ii.1958, (W. Kempf) [MZSP]; 2 workers, Campo Limpo, Faz. Conceição, 16°19'51,0"S 49°09'49,2"W, 01-07.vii.2005, (Silva, R. R. & Feitosa, R. M.) [MZSP]; 2 gynes, Niquelândia, 14°01'S 48°18'W, 24.ix-6.x.1995, (Silvestre, Dietz & Brandão) [MZSP]; 2 workers, Ouro Verde, Faz. Boa Vista, 16°17'54,5"S 49°12'42,6"W, 20-24.i.2005, (Silva, R. R.) [MZSP]. **Minas Gerais:** 5 workers, Belo Horizonte, Campus UFMG, Estação Ecológica, 19°52'55.9"S 43°58'17.5"W, 04.ix.2013, (Formigas do Brasil, Grupo 2) [DZUP]; 1 worker, Caete, 19.7701194 S 43.6432389 W, 5-8.xi.2014, (I. Gerheim) [UFV]; 1 worker, Itumirim, 21°13'44.8"S 44°50'50.1"W, 19.iii.2014, (Queiroz et al.) [DZUP]; 2 workers, Itumirim, 21°14'11.35"S 44°49'27.5"W, 19.iii.2014, (Queiroz et al.) [DZUP]; 1 worker, Machado, 21°41'01.87"S 46°01'01.35"W, 11.ii.2015, (Angotti et al.) [DZUP]; 1 worker, Machado, 21°41'50.50"S 46°00'50.39"W, 27.ii.2015, (Angotti et al.) [DZUP]; 1 worker, Machado, 21°42'13.83"S 46°05'13.34"W, 27.ii.2015, (Angotti et al.) [DZUP]; 1 worker, Machado, 21°42'17.18"S 46°05'16.14"W, 27.ii.2015, (Angotti et al.)

[DZUP]; 1 worker, Nova Lima, Vale/SA, Mina da Mutuca, 20°01'43"S 43°57'10"W, 12.vii.2012, (Queiroz et al.) [DZUP]; 1 worker, Nova Lima, Vale/SA, Mina cap. Xavier, 20°02'47"S 43°58'59"W, 12.ii.2012, (Queiroz et al.) [DZUP]; 1 worker, Nova Lima, Vale/SA, Mina Tamanduá, 20°05'17"S 43°56'27"W, 12.ii.2012, (Queiroz et al.) [DZUP]; 1 worker, Nova Lima, 20°05'56.8"S 43°57'06.6"W, 12.vii.2012, (Queiroz et al.) [DZUP]; 1 worker, Parque Estadual do Itacolomi, -20.426694 -43.506465, 25-31.x.2016, (Soares, G., Falcon, J. E., Climaco, L. F., Pontes, T.) [UFV]; 1 worker, Poço Fundo, 21°47'30.41"S 45°59'46.11"W, 21.i.2015, (Angotti et al.) [DZUP]; 5 workers, Pouso Alegre, [22°13'29.3"S] [45°56'02.9"W], vi.1963, (F. S. Pereira) [MZSP]; 1 worker, Ritápolis, FLONA Ritápolis/ IBAMA, 21°03'21"S 44°15'35"W, 24.iii.2006, (de Paula, G. A. R.) [DZUP]; 1 worker, Rodovia MG 355, 21°29'04.51"S 44°57'51.41"W, ix.2011, (Lasmar et al.) [DZUP]; 11 workers, Serra Caraça, [20°07'59.6"S] [43°30'00.0"W], xi.1961, (Kloss, Lenko, Marins & Silva) [MZSP]; 1 worker, Serro, [18°32'21.8"S] [43°26'08.8"W], vi.1976, (R. Negretl) [MZSP]; 2 workers, Viçosa, UFV - Mata Paraíso, [20°48'08.1"S] [42°51'31.1"W], vii.2001, (Mariano, C) [DZUP]; 1 male, Viçosa, UFV - Mata da Biologia, -20.755944 S -42.860005 W, 2.x.2014, (F. Rezende) [UFV]; 1 gyne, Viçosa, UFV - Mata da Biologia, -20.755944 S -42.860005 W, 2.x.2014, (F. Rezende) [UFV]; 2 workers, Viçosa, Mata do Seu Nico, [20°44'56.1"S] [42°52'30.2"W], 13.iv.2012, (Rezende, Jesus & Schmidt) [UFV]. **Mato Grosso:** 4 workers, Itaum, [15°37'31.8"S] [56°08'49.2"W], iii.1974, (M. Alvarenga) [MZSP]. **Paraná:** 2 workers, Antonina, Res. Nat. Guaricica, -25.3058° 48.6576°, 23.iv.2017, (E. Villarreal. J. Lattke) [DZUP]; 2 workers, Antonina, Res. Nat. Guaricica, -25.3058° 48.6576°, 22-23.iv.2017, (E. Villarreal. J. Lattke) [DZUP]; 1 worker, Antonina, Reserva Rio Cachoeira, 25°18'01.48"S 48°40'16.52"W, 02-05.iii.2014, (Calixto, J. M. & Feitosa, R. M.) [DZUP]; 1 worker, Balsa Nova, São Luis do Purunã, [25°27'43.8"S] [49°42'36.4"W], 14.x.2006, (Dias & Beltrami.) [DZUP]; 1 worker, Curitiba, [25°25'01.0"S] [49°16'07.9"W], 14.x.2004, (Wendt, L. D.) [DZUP]; 1 worker, Curitiba, Mata Viva; Centro Politécnico, [25°26'46.6"S] [49°14'02.0"W], 21.i.2009, (Mauselen, M.) [DZUP]; 5 workers, Curitiba, Centro Politécnico, [25°26'51.9"S] [49°13'58.0"W], 14.v.1982, (Almeida, Fº A. J.) [DZUP]; 1 worker, Curitiba, Centro Politécnico, [25°26'51.9"S] [49°13'58.0"W], 16.v.2014, (Ferreira, A.) [DZUP]; 1 worker, Curitiba, Centro Politécnico, [25°26'51.9"S] [49°13'58.0"W], 24.xi.2007, (Fantinatti, E. C. S.) [DZUP]; 1 worker, Curitiba, Centro Politécnico, Mata Viva, [25°26'51.9"S] [49°13'58.0"W], 15.x-10.xii.2008, (Moussalen, M.) [DZUP]; 2 workers, Curitiba, Centro Politécnico, [25°26'51.9"S] [49°13'58.0"W],

13.iii.2008, (Corrêa, R. C.) [DZUP]; 2 workers, Curitiba, Bairro Lindóia, 25°28'37"S 49°16'32"W, 04.iv.2013, (Benatti, F. J. R) [DZUP]; 1 worker, Foz do Iguaçu, [25°30'58.8"S] [54°33'39.8"W], 15.ix.1969, (Cichovski, E.) [DZUP]; 1 worker, Guaíra, [24°05'24.0"S] [54°14'17.3"W], viii.1982, (Cordeiro, A. M.) [DZUP]; 4 workers, Ilha do Mel, 25°33'04.22"S 48°18'01.19"W, 07.xii.2014, (Savaris, M.) [DZUP]; 1 worker, Irati, Guamirim. Fz. Arroio Grande, Talhão 15, 25°35'36.11"S 50°49'12.06"W, 13.x.2014, (Marques, C. G. P & Falbot, L.) [DZUP]; 1 worker, Irati, Guamirim. Fz. Arroio Grande, Talhão 3, 25°35'36.11"S 50°49'12.06"W, 01.xii.2014, (Marques, C. G. P & Falbot, L.) [DZUP]; 11 workers, Jaguariaiva, Parque Estadual do Cerrado, 24°10'04.7"S 49°39'59.8"W, 15.i.2015, (A. M. Oliveira, R. Feitosa, J. Maravalhas, H. Vasconcelos) [DZUP]; 4 workers, Jaguariaiva, Parque Estadual do Cerrado, 24°10'47.6"S 49°40'05.5"W, 15.i.2015, (A. M. Oliveira, R. Feitosa, J. Maravalhas, H. Vasconcelos) [DZUP]; 15 workers, Jaguariaiva, Parque Estadual do Cerrado, 24°11'15.9"S 49°39'53.1"W, 15.i.2015, (Oliveira, A. M.; Feitosa, R.; Maravalhas, J.; Vasconcelos, H.) [DZUP]; 1 worker, Morretes, Estrada da Graciosa, [25°21'02.7"S] [48°52'45.2"W], 14.xii.2013, (Feitosa, R. et al.) [DZUP]; 1 worker, Palmas, R. V. S. C. P., 26°30'13.78"S 51°39'44.53"W, 17-20.ii.2017, (R. Feitosa, W. Franco, P. Andrade) [DZUP]; 27 workers, Palmas, R. V. S. C. P., 26°30'30"S 51°40'8.12"W, 17-20.ii.2017, (R. Feitosa, W. Franco, P. Andrade) [DZUP]; 1 worker, Palotina, RPPN Fazenda Assu, [24°17'59.0"S] [53°50'20.7"W], 23.iii.2013, (Gonçalves, R. & Soares, P.) [DZUP]; 1 worker, Paranaguá, Floresta Estadual do Palmito, 25°34'08"S 48°32'08"W, 25-26.viii.2014, (Queiroz-Santos, L.) [DZUP]; 1 worker, Piraquera, Mananciais da Serra, 25°29'45.5"S 48°58'58.2"W, 14.xi.2002, (Garcia, E. Q.) [DZUP]; 1 worker, Piraquara, Mananciais da Serra, [25°29'S] [48°58'W], 19.x.2007, (Woiski, T.) [DZUP]; 1 worker, Piraquera, Mananciais da Serra, 25°29'S 48°58'W, 12.xii.2002, (Garcia, E. Q.) [DZUP]; 1 worker, Piraquera, Mananciais da Serra, 25°29'S 48°58'W, 19.x.2013, (Calixto, J. M) [DZUP]; 1 worker, Piraquera, Mananciais da Serra, [25°29'S] [48°58'W], 29.iii.2007, (Bergamaschi, A. C. B.) [DZUP]; 1 worker, Ponta Grossa, Pq. Estadual de Vila Velha, 25.232°S 49.998°W, 29-30.ix.2012, (Rosa, B.) [DZUP]; 13 workers, Ponta Grossa, P. E. Vila Velha, 25°14'37.85"S 50°00'44.05"W, 24-28.XI.2014, (W. Franco, R. M. Feitosa, A.C. Ferreira, F. Benatti) [DZUP]; 8 workers, Ponta Grossa, P. E. Vila Velha, 25°14'37.85"S 50°00'44.05"W, 19-22.xii.2016, (R. Feitosa, W. Franco, A. C. Neundorf, Y. S. Moreira) [DZUP]; 10 workers, Ponta Grossa, P. E. Vila Velha, 25°14'37.85"S 50°00'44.05"W, 24-28.XI.2014, (W. Franco, R. M. Feitosa, A. C. Ferreira, F. Benatti) [DZUP]; 3 workers, Ponta Grossa, P. E.

Vila Velha, 25°14'52.74"S 49°59'35.01"W, 19-22.xii.2016, (R. Feitosa, W. Franco, A. C. Neundorff, Y. S. Moreira) [DZUP]; 12 workers, Ponta Grossa, P. E. Vila Velha, 25°14'52.74"S 49°59'35.01"W, 24-28.xi.2014, (W. Franco, R. M. Feitosa, A.C. Ferreira, F. Benatti) [DZUP]; 5 workers, Tibagi, P. E. do Guartela, 24°34'7.18"S 50°15'34.72"W, 20-25.ix.2015, (W. Franco, R. M. Feitosa, A. Machado) [DZUP]; 3 workers, Toledo, Bairro Vila Institucional, 24°42'13"S 53°45'06"W, 31.v.2013, (Musolon, L. M.) [DZUP].

Pernambuco: 3 males, Caruaru, [8°11'65.8"S] [36°01'30.3"W], v.1972, (T. Lima) [MZSP].

Rio Grande do Sul: 1 worker, Derrubadas, Parque Estadual do Turvo, [27°13'57.4"S] [53°51'04.8"W], 25.iv.2009, (T. Marques) [UFV]; 5 workers, Paraci Novo, [29°38'16.4"S] [51°23'52.8"W], 12.xii.1925, (Borgmeier) [MZSP]; 1 worker, Porto Alegre, [30°05'16.5"S] [51°10'20.5"W], 21.i.2014, (Ries, A. C.) [DZUP]; 2 workers, Porto Alegre, Morro do São Pedro, [30°10'25.7"S] [51°11'48.2"W], 18-19.i.2008, (Ulyssea, M. A.) [DZUP]; 2 workers, Porto Alegre, Lami, [30°13'16.0"S] [51°05'40.0"W], 09.ix.2014, (Ries, A. C.) [DZUP]; 4 workers, Santa Cruz do Sul, [29°43'06.7"S] [52°25'43.5"W], 23.xi.2009, (Lemes, J. R. A) [DZUP]; 2 workers, [30°02'20.3"S] [51°13'10.3"W], vii.1969, (R. L. Araújo) [MZSP].

Rio de Janeiro: 4 workers, Ilha Grande, 23°10'52"S 44°21'06"W, 08.xi.2009, (Coelho, R.) [DZUP]; 1 worker, Ilha Grande, Trilha Parnaioca, 23°11'02"S 42°11'39"W, 01.xii.2009, (Myhé, A. J.) [DZUP]; 2 workers, Itatiaia, P. N. Itatiaia, 22°25'23.36"S 44°37'53.71"W, 20.i.2015, (Lasmar et al.) [DZUP]; 2 workers, Itatiaia, P. N. Itatiaia, 22°25'51.62"S 44°36'57.36"W, 20.i.2015, (Lasmar et al.) [DZUP]; 2 workers, Itatiaia, P. N. Itatiaia, 22°27'08.56"S 44°36'55.74"W, 20.i.2015, (Lasmar et al.) [DZUP]; 2 workers, Itatiaia, P. N. Itatiaia, 22°27'46.56"S 44°35'34.21"W, 20.i.2015, (Lasmar et al.) [DZUP].

Santa Catarina: 1 worker, Blumenau, [26°51'40.2"S] [49°05'27.1"W], i.1958, (R. Müller) [MZSP]; 1 worker, Caçador, [26°46'52.7"S] [50°59'55.6"W], 20.xi.2008, (Mozlerle, H.) [UFSC]; 1 worker, Canasvieiras, [27°26'03.6"S] [48°27'31.1"W], v.1960, (Casemiro) [MZSP]; 1 worker, Chapecó, Monte Belo, [27°06'45.5"S] [52°37'25.3"W], 01-31.i.2013, (Savans, M. & Lampert, S.) [DZUP]; 1 worker, Florianópolis, Lagoa Pequena, [27°39'45.0"S] [48°28'36.5"W], 17.iii.2009, (Albertoni, F. F.) [DZUP]; 1 worker, Florianópolis, Ilha dos Moleques do Sul, [27°50'47.4"S] [48°25'52.0"W], 29.i.2006, (Ulyssea, M. A.) [DZUP]; 1 worker, Florianópolis, UFSC, [27°36'06.1"S] [48°31'14.8"W], 27.ix.2013, (Klunk, C. L. & Bruno, A. S.) [UFSC]; 1 worker, Florianópolis, Ilha do Arvoredo, [27°16'49.1"S] [48°21'58.8"W], 13.i.1988, (Voltolini, J.) [UFSC]; 1 worker, Florianópolis, UCAD, [27°31'52.5"S] [48°30'45.4"W], 09.i.2003, (Dornelles, R.) [UFSC]; 1 worker,

Florianópolis, UCAD, [27°31'52.5"S] [48°30'45.4"W], 30.v-07.v.2004, (Rosumek, F. B.) [UFSC]; 3 workers, Florianópolis, Morro da Lagoa, [27°36'02.9"S] [48°28'52.9"W], 19.xii.1989, (Leal, I. R. & Lopes, B. C.) [UFSC]; 2 workers, Florianópolis, Morro da Lagoa, [27°36'02.9"S] [48°28'52.9"W], 13.xi.1989, (Leal, I. R. & Lopes, B. C.) [UFSC]; 1 worker, Florianópolis, Morro da Lagoa, [27°36'02.9"S] [48°28'52.9"W], 16.iii.1993, (da Silva, R. R. & Lopes, B. C.) [UFSC]; 1 worker, Florianópolis, Morro da Lagoa, [27°36'02.9"S] [48°28'52.9"W], 01.iii.1990, (Leal, I. R. & Lopes, B. C.) [UFSC]; 3 workers, Florianópolis, Morro da Lagoa, [27°36'02.9"S] [48°28'52.9"W], 01.xi.1989, (Leal, I. R. & Lopes, B. C.) [UFSC]; 1 worker, Florianópolis, Morro da Lagoa, [27°36'02.9"S] [48°28'52.9"W], 09.iii.1992, (da Silva, R. R. & Lopes, B. C.) [UFSC]; 1 worker, Florianópolis, Morro da Lagoa, [27°36'02.9"S] [48°28'52.9"W], 13.x.1989, (Leal, I. R. & Lopes, B. C.) [UFSC]; 1 worker, Florianópolis, Morro da Lagoa, [27°36'02.9"S] [48°28'52.9"W], 22.iii.1990, (Leal, I. R. & Lopes, B. C.) [UFSC]; 2 workers, Florianópolis, UFSC, [27°36'06.1"S] [48°31'14.8"W], 27.ix.2013, (Klunk, C. L. & Bruno, A. S.) [UFSC]; 1 worker, Florianópolis, [27°36'25.9"S] [48°29'42.2"W], 21.ix.1990, (Butignol, C. A.) [UFSC]; 1 worker, Florianópolis, Lagoa Pequena, 27°39'45.0"S 48°28'36.5"W, 20.viii-25.viii.2005, (GEBAR) [UFSC]; 1 worker, Florianópolis, Lagoa Pequena, 27°39'45.9"S 48°28'37.4"W, 16.xii-22.xii.2006, (GEBAR) [UFSC]; 3 workers, Florianópolis, Lagoa Pequena, 27°39'46.9"S 48°28'51.2"W, 16.xii-22.xii.2006, (GEBAR) [UFSC]; 1 worker, Florianópolis, Lagoa Pequena, 27°39'47.6"S 48°28'50.7"W, 16.xii-22.xii.2006, (GEBAR) [UFSC]; 1 worker, Florianópolis, Lagoa Pequena, 27°39'47.8"S 48°28'44.8"W, 16.xii-22.xii.2006, (GEBAR) [UFSC]; 1 worker, Florianópolis, Faz da Ressacada – UFSC, 27°41'08"S 48°32'28"W, 23.ii.2017, (da Silva, C. M.) [UFSC]; 1 worker, Florianópolis, Faz da ressacada – UFSC, 27°41'08"S 48°32'28"W, ii.2017, (da Silva, C. M.) [UFSC]; 1 worker, Florianópolis, Ilha dos Moleques do Sul, [27°50'47.4"S] [48°25'52.0"W], 15.iii.1991, (Silva, J. D.) [UFSC]; 1 worker, Florianópolis, Canto da Lagoa, -27.533657 -48.458410, 15.ii.2016, (J. Chaul) [UFV]; 3 workers, Ibirama, [27°00'57.7"S] [49°31'33.8"W], 29.iv-01.v.2016, (Nunes, A. P.) [DZUP]; 1 worker, Navegantes-Indaial, BR – 470, [26°52'14"S] [49°06'23"W], 18.xii.2009, (Ulyssea, M. A.) [DZUP]; 1 worker, Navegantes-Indaial, BR – 470, [26°52'14"S] [49°06'23"W], 20.xii.2009, (Ulyssea, M. A.) [DZUP]; 1 worker, Navegantes-Indaial, BR – 470, [26°52'14"S] [49°06'23"W], 18.xii.2009, (Ulyssea, M. A.) [DZUP]; 2 males, Nova Teutônia, [27°09'24.9"S] [52°17'58.4"W], x.1971, (F. Plaumann) [MZSP]; 1 worker, Santo Amaro da Imperatriz,

[27°41'00.3"S] [48°45'42.7"W], 11.i.2014, (Lippi, B. B.) [UFSC]; 1 worker, Santo Amaro da Imperatriz, [27°41'00.3"S] [48°45'42.7"W], 14.xii.2013, (Lippi, B. B.) [UFSC]; 2 workers, Três Barras, FLONA de Três Barras., 26°07'35.56"S 50°18'51.17"W, 21.xii.2014, (Ortiz, D. C. et al) [DZUP]. **São Paulo:** 1 male, Caraguatatuba, Res. Flor. 40m, [23°35'43.1"S] [45°25'43.9"W], 7-14.vii.1962, (Exp. Dep. Zool) [MZSP]; 2 workers, Caraguatatuba, Res. Flor. 40m, [23°35'43.1"S] [45°25'43.9"W], 7-14.vii.1962, (Exp. Dep. Zool) [MZSP]; 1 male, Caraguatatuba, Res. Flor. 40m, [23°35'43.1"S] [45°25'43.9"W], 22.v-1.vi.1962, (Exp. Dep. Zool) [MZSP]; 3 workers, Caraguatatuba, Res. Flor. 40m, [23°35'43.1"S] [45°25'43.9"W], 22.v-1.vi.1962, (Exp. Dep. Zool) [MZSP]; 1 worker, Itapiranga, Cerrado, 22°15'24.20"S 47°49'01.37"W, 09-17.xi.2015, (Martins A, L. & Moericke, P. S.) [DZUP]; 1 worker, Jaboticabal, 21°15'32"S 48°16'49"W, 5.ii.2013, (Batista, M. N.) [DZUP]; 3 workers, Jundiai, Serra do Japi, 23°13'S 46°58'W, xii.2010 - vii.2011, (Postali, T. C.) [DZUP]; 1 worker, São Paulo, Campus USP, [23°33'40.6"S] [46°43'51.0"W], 1979, (without collector) [DZUP]; 2 workers, Sete Barras, P. E. Carlos Botelho, 24°03'S 47°59'W, 16.i-05.ii.2013, (Camargo, P. H.) [DZUP]; 2 males, Selesópolis, Est. Biol. Boraceia, [23°37'51"S] [45°52'11"W], 11.v.1961, (K. Lenko) [MZSP]; 2 workers, Selesópolis, Est. Biol. Boraceia, [23°37'51"S] [45°52'11"W], 11.v.1961, (K. Lenko) [MZSP].

3.13- *Pachycondyla* sp. n

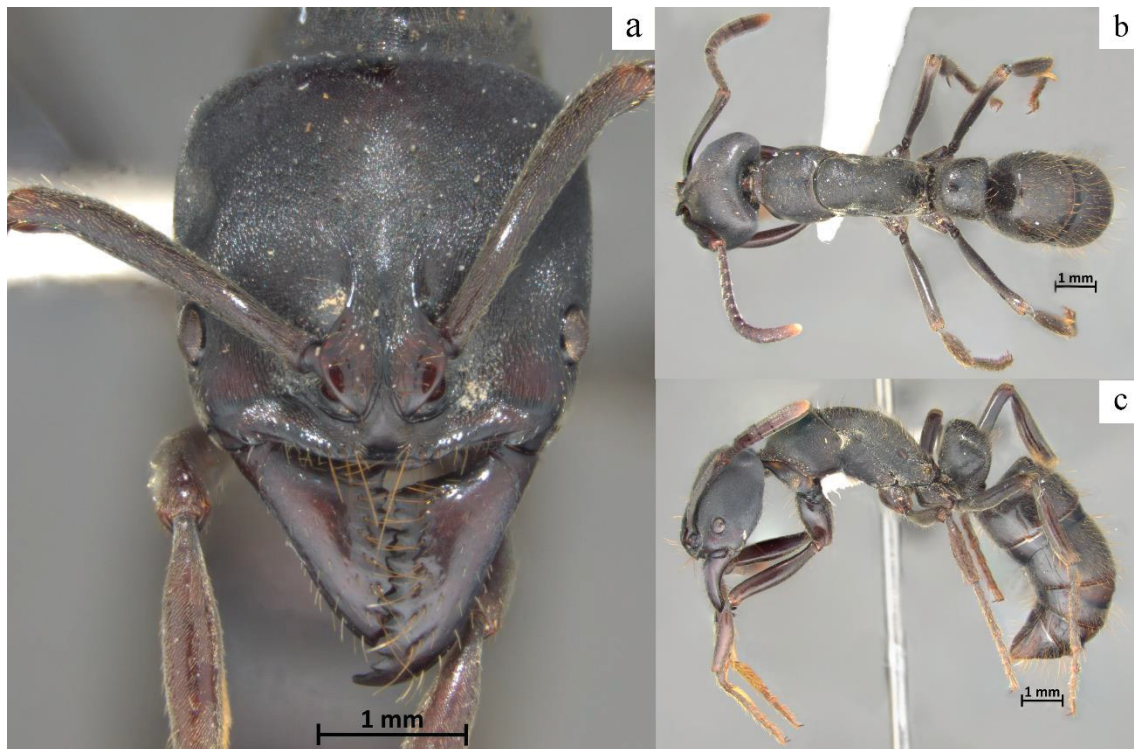


Fig 40: *Pachycondyla* sp. n (holotype DZUP 548863). a: head in frontal view. b: full body in dorsal view; c: full body in lateral view.

Holotype worker BRAZIL, Goiás, São Domingos, Lapa da terra ronca, vii,1985 (*F. Cheimowicz*) [MZSP]. Paratype gyne BRAZIL, Bahia, Itabuna, 30.xii.2008 (*J. R. Delabie*). Paratype gyne, BRAZIL, Pará, Novo Progresso, Fazenda Florentino, 07°07'45.71"S 55°23'21.12"W, 12.xii.2010-08.ii.2011 (*D. Krinski*) [DZUP].

Worker diagnosis: The following suit of characters diagnoses this species:

- 1- Large body size (> 10 mm).
- 2- Mandible without striae on its dorsum.
- 3- Clypeal distance longer than antennal scape width.
- 4- Anteroventral clypeal margin without strong concavity.
- 5- Absence of overhanging integument in humeral angle.
- 6- Absence of shining humeral carina.
- 7- Propodeal declivitous margin without lateral expansions.
- 8- Dorsal and posterior faces of petiole shining, with piligerous punctures.
- 9- Petiolar shape in posterior view with lateral margins gradually converging ventrally.

Worker description: Mandible triangular in dorsal view with nine to ten teeth along masticatory margin, five smaller intercalary teeth present between four to five larger

teeth; dorsum shining with sparse piligerous punctures. Head subquadrate in full-face view, with convex lateral margin and weakly concave posterior cephalic margin. Clypeal anteromedian margin weakly concave, median clypeal area longitudinally elevated, extending posterad between frontal lobes, finely longitudinally striate on supraclypeal area. Dorsal malar area longitudinally striate. Frons finely striate-reticulate anteriorly that become rolls of punctures posteriorly. Ventral surface of head longitudinally striate. Scape reaching vertex but not surpassing it when stretched posteriorly, with piligerous punctulae.

Mesosomal dorsal margin smoothly convex in lateral view, propodeal declivitous margin straight, forming a blunt angle with propodeal lateral face. Humeral carina absent, humeral angle not overhanging pronotal side; pronotal dorsum anteriorly with transverse striae that curve posteriorly on sides forming U-shaped pattern, lateral pronotal surface longitudinally substrigulate. Propleuron with piligerous punctulae. Mesonotum longitudinally substrigulate in dorsal view, dorsal propodeal face transversely strigulate. Mesopleural sulcus poorly developed, almost absent; mesometapleuron and lateral propodeal face continuously longitudinally substrigulate. Propodeal declivity transversally substrigulate anteriorly, with transverse strigae centrally affect medially, tending to smooth and shining posteromedially; length of dorsal margin in lateral view three fourths of declivitous margin.

Petiolar node roundly trapezoid in dorsal view, anterior margin convex, narrower than posterior margin; higher than long in lateral view; anterior margin slightly anteriorly inclined and posterior parallel; in posterior view dorsally broader than ventrally, sides uniformly converging dorso-ventrad; anterior and dorsal surfaces shining with piligerous punctulae, lateral surfaces imbricate to finely striate and posterior surface smooth and shining or finely imbricate. Subpetiolar process roughly subtriangular in lateral view, anterior margin straight, forming a postero-ventral projected curved teeth; posterior margin swollen almost round rounded, ventrally transversely costulate.

Gaster shining; anterior margin of abdominal tergite III vertical and straight in lateral view, forming right angle with dorsal margin; abdominal tergites III-V punctate, tergite VI punctate dorsally, laterally longitudinally strigulate. Pygidium longitudinally costulate laterally, dorsally smooth and shining, slightly flattened medially. Prora about same size as metatrochanter, resembling to a brief crest, triangular with anterior margin straight, oblique with small ventrally projected point. Sternites III-IV punctate, IV smooth

and shining centrally, punctate posterolaterally; V sparsely punctate; hypopigium anteriorly punctulate, medioposteriorly with shallow scattered punctures, posterior margin strongly convex below stinger.

Mandible with sparse hairs on dorsum and two parallel rows of decumbent hairs along masticatory margin. Clypeal medial area without hairs, anterior margin with long yellow setae, reaching third or fourth mandibular tooth. Head with appressed and decumbent pubescence, with sparse erect hairs on dorsal and ventral surfaces. Pubescence sparse anteromedially on ventral head surface.

Mesosoma finely pubescent, with sparse erect yellow hairs. Procoxa pubescent with long erect yellow hairs anteriorly and short erect hairs posteriorly; profemur dorsum without hairs and sparse suberect hairs ventrally. Protibia with one stout apical seta, ventral apex and probasitarsus with dense golden appressed pilosity; other protarsal segments with robust setae ventrally. Mid and hind legs with fine pubescence and sparse suberect yellow hairs on ventral side of coxae, femora and tibiae; six stout setae on mesotibial apex and two on metatibial apex. Tarsi with robust setae. Petiole and gaster finely pubescent with sparse erect and suberect yellow long and medium hairs.

Mandible black, reddish black or red. Body black. Coxae black or reddish black.

Gyne description: Mandible triangular in dorsal view with nine to ten teeth along masticatory margin, five smaller intercalary teeth present between four to five larger teeth; dorsum shining with weak evidence of substrigulae and sparse piligerous punctures. Head subquadrate in full-face view, with convex lateral margin and weakly concave posterior cephalic margin. Clypeal anteromedian margin weakly concave, median clypeal area longitudinally elevated, extending between frontal lobes, finely longitudinally striate on supraclypeal area. Dorsal malar area longitudinally striate. Frons finely striate-reticulate anteriorly that become rolls of punctures posteriorly; ocelli small, apart from each other by three diameters, located midlength between frontal carina posterior limit and vertexal margin. Ventral surface of head longitudinally striate with sparse punctures. Scape reaching vertex but not surpassing it when stretched posteriorly, shining with piligerous punctulae.

Mesosomal dorsal margin smoothly convex in lateral view, with rounded edges on propodeal declivitous margin. Humeral carina absent not overhanging pronotal side; pronotal dorsum anteriorly with transverse striae that curve posteriorly on sides forming

U-shaped pattern, lateral pronotal surface longitudinally substrigulate. Propleuron with piligerous punctulae. Mesonotum longitudinally substrigulate in dorsal view. Mesoscutum wide and flat, longitudinally substrigulate with sparse punctures, parapsidal lines visible. Scutoscuteellar sulcus narrow with longitudinal costulae; Axilla punctate and Axillula longitudinally costate. Mesoscutellar disc weakly longitudinally substrigulate. Mesopleural sulcus well developed and visible; metascutellar trough punctate; mesometapleuron and lateral propodeal face continuously longitudinally substrigulate.

Propodeal, petiolar and gastral shape and integument sculpturing, identical to workers. Pubescence and body color identical to workers.

Measurements: Holotype: HW: 2.73mm; HL: 2.94mm; CI: 93; CD: 0.16mm; SL: 2.45mm; EL: 0.43mm; REL: 16; WL: 4.19mm; PnW: 1.83mm; TL: 2.20mm; NW: 1.55mm; NL: 1.35mm; PelI: 115; PPL: 1.67mm.

Non-type material: Workers (n = 2): HW: 2.36 – 2.73mm; HL: 2.49 – 2.94mm; CI: 93 – 95; CD: 0.16 – 0.20mm; SL: 1.92 – 2.45mm; EL: 0.41 – 0.43mm; REL: 15.67 – 17.24; WL: 3.43 – 4.19mm; PnW: 1.71 – 1.83mm; TL: 1.80 – 1.84mm; NW: 1.51 – 1.55mm; NL: 1.26 – 1.35mm; PelI: 115 – 119; PPL: 1.47 – 1.67mm.

Similar species: *Pachycondyla* sp. n is part of the *impressa* species group. It differs from *P. impressa* by having the clypeus longer than the antennal scape width while *P. impressa* has the clypeus shorter than the antennal scape width. The petiole of *Pachycondyla* sp. n is shining with piligerous punctures on the dorsal and posterior faces, but *P. impressa* has a transversely striate dorsal surface and a transversely imbricate posterior face, this is also applicable when comparing the petiole of *Pachycondyla* sp. n with *P. fuscoatra*, *P. inca* and *P. purpurascens*.

Distribution: Occurs from Pará (northern limit) to São Paulo (southern limit), from Pernambuco (eastern limit) to Mato Grosso (western limit). One of the few records of *Pachycondyla* from Pernambuco is of *Pachycondyla* sp. n. Although we do not examined samples from Maranhão, Piauí, Tocantins, Goiás, Distrito Federal, and Espírito Santo, it is possible that this species occurs in these states as well, since they are in the middle of the known localities.

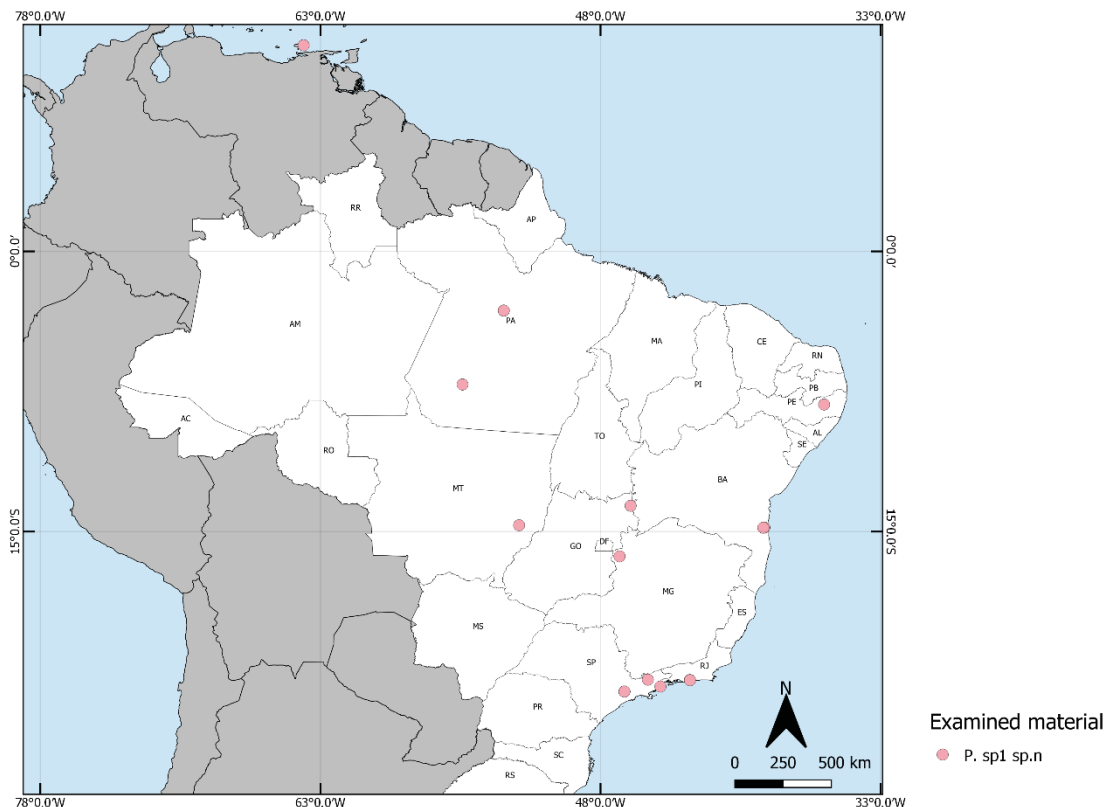


Fig 41- Examined material distribution map of *P. sp1 sp. n.*

Discussion: Every specimen we found of this species was previously identified as *P. impressa*. It has the diagnostic characters of *P. impressa* used by Kempf (1961) and MacKay & MacKay (2010) in their revision of the genus (see [P. impressa](#) discussion). It is possible that every published record of *P. impressa* from Brazil is actually of *Pachycondyla sp. n.*

One Venezuelan worker examined is considered to be a representative of *Pachycondyla sp. n.*, and at first sight could provoke doubt if it is the same species, due to its noticeable small size when compared with the holotype. Considering significant specimen size variation in other species (e. g. *P. crassinoda* and *P. striata*) we consider this small Venezuelan specimen an exemplar of *Pachycondyla sp. n.* Aside from the size difference, this exemplar does not present other morphological differences.

Examined material: n = 21: **Holotype:** 1 worker, Brasil, Goiás (GO), São Domingos, Lapa da terra ronca, [13°37'18.8"S] [46°23'14.0"W], vii.1985, (F. Chaimowiez) [MZSP]. **Paratypes:** BRAZIL: **Bahia:** 1 gyne, Itabuna, [14°47'46.5"S] [39°16'48.7"W], 30.xii.2008, (J. R. Delabie) [DZUP]. **Pará:** 1 gyne, Novo Progresso, Fazenda Florentino, 07°07'45.71"S 55°23'21.13"W, 12.xii.2010-08.iii.2011, (D. Krinski) [DZUP].

BRAZIL: **Minas Gerais:** 1 worker, Unai, Gruta Tamboril, [16°19'37.9"S] [46°58'47.1"W], 17.vi.1989, (Gregeo) [MZSP]. **Mato Grosso:** 1 worker, Xavantina, [14°39'49.7"S] [52°21'30.7"W], 21.vii.1976, (Negrett) [MZSP]. **Pará:** 7 workers, Medicilândia, Cav. Limoeiro, [3°10'24.0"S] [53°10'41.7"W], 17.x.1988, (E. Trajano) [MZSP]; 1 workers, Medicilândia, Cav. Limoeiro, [3°10'24.0"S] [53°10'41.7"W], 25.x.1988, (E. Trajano) [MZSP]. **Pernambuco:** 1 worker, Caruaru, [8°12'04.2"S] [36°01'27.9"W], iv.1972, (M. Alvarenga) [MZSP]. **Rio de Janeiro:** 1 gyne, Rio de Janeiro, Corcovado, [22°57'07.6"S] [43°12'41.4"W], 19.x.1957, (Seabra e Alvarenga) [MZSP]; 1 gyne, Rio de Janeiro, Corcovado, [22°57'07.6"S] [43°12'41.4"W], 19.v.1959, (Seabra e Alvarenga) [MZSP]; 1 gyne, Rio de Janeiro, Pto. D. Caixas, [22°57'36.7"S] [43°12'22.3"W], iii.1928, (O. Conde) [MZSP]. **São Paulo:** 1 gyne, Pindamonhangaba, [22°55'51.1"S] [45°27'29.4"W], (without date), (Schwarzmeier) [MZSP]; 1 gyne, São Paulo, Butantan, [23°34'05.3"S] [46°43'02.2"W], 1991, (L. Forneris) [MZSP]; 1 worker, Ubatuba, P. E. Serra do Mar, 23°17'56,40"S 44°47'13,20"W, 03-14.iii.2008, (Esteves, F. A. & Feitosa, R. M.) [MZSP]; VENEZUELA: 1 worker, Venezuela, Margarita, Sebastian, 11.0293° -63.8995°, 05.vii.2010, (J. Lattke) [DZUP].

4- Conclusions:

All *Pachycondyla* species registered to Brazil are described in detail. We were able to update the generic concept of *Pachycondyla*, from Schmidt & Shattuck (2014). Detailed work over males and gynes are still necessary, since some of these forms are still unknown for a number of species.

Species distributions to Brazil are updated and a new species identification key is provided, containing all known species of *Pachycondyla* and with high-resolution images, this should help future myrmecologists do correctly determine *Pachycondyla* specimens.

Pachycondyla curiosa is removed from the genus, now classified as *incertae sedis* in Ponerinae and a new genus for this species should be proposed. *Pachycondyla constricticeps* is synonymized in *P. striata*, since the two known specimens of *P. constricticeps* are arguably parasitized *P. striata* specimens. The previously unknown gyne of *Pachycondyla lenkoi* is described. A new species is described with workers and gynes.

The loss of the *P. fuscoatra* type material is of great importance and began great confusion over this species identity due to similarities with *P. impressa*. Hopefully this problem is now clarified.

Studying multiple exemplars of one species can reveal significant intra-specific morphological variation and provides a better resolution of the diagnostic characters for a given species. Blindly relying on previous diagnostic characters may hide really useful ones and lead researchers to wrong taxonomic decisions. With careful morphological analyses, we describe a new species based on a distinct morphology under the *P. impressa* name. All records of *P. impressa* for Brazil are probably of this previously undescribed species. The typical *P. impressa* does not occur in Brazil and its diagnose is updated, for better characterization on the species. It is obvious that there are still unsolved challenges in the *impressa* species group, but this should involve a broader sampling than just the Brazilian material.

The *Pachycondyla harpax* problem is still a taxonomic challenge and remains unsolved. Integrative taxonomy techniques should bring light over this problem, with detailed numerical-morphology over the type materials, gynes and males, nuclear DNA tests for genetic indication of species identity, hybridization and evolutionary scenarios, cuticular hydro-carbonates analyses for species specific recognition cues (Seifert, 2009) and UCE analyses, establishing phylogenetic relationships among these cryptic species (Faircloth *et al.*, 2015). These approaches combined with already existing karyotype and distribution studies should reveal the cryptic species within the probably *harpax* species complex.

5- References:

- AntWeb. Available from <<https://www.antweb.org/>>. Accessed at 20, December, 2019.
- AntWiki. Available from <https://www.antwiki.org/wiki/Brazil#Pachycondyla>. Accessed at 17, January .2020
- Baker, D. B., 1994. Type material in the University Museum, Oxford, of bees described by Comte Amédée Lepeletier de Saint-Fargeau and Pierre André Latreille (Hymenoptera: Apoidea). **Journal of Natural History**. v. 20, n.5, p. 1189-1204.
- Baum, D. A., Donoghue, M. J., 1995. Choosing among Alternative “Phylogenetic” Species Concepts. **Systematic Botany**. v. 20, n. 4, p. 560-573.

Bolton, B., 2019. **An online catalog of the ants of the world**. Available from <<http://antcat.org>>. Accessed at 22 October 2019.

Boudinot, B. E., 2015. Contributions to the knowledge of Formicidae (Hymenoptera, Aculeata): a new diagnosis of the family, the first global male-based key to subfamilies, and a treatment of early branching lineages. **European Journal of Taxonomy**. n. 120, p. 1-62.

Boudinot, B. E., 2019. Clave para las subfamilias y géneros basada en machos. In: Fernández, F., Guerrero, R. J., Delsinne, T. **Hormigas de Colombia**. Bogotá. Universidad Nacional de Colombia. 2019., p. 487 - 500

Brown Jr., W. L., 1950. Morphological, taxonomic, and other notes on ants. **The Wasmann Journal of Biology**. p. 241 – 250.

Brown, Jr, W. L., 1973. A comparison of the Hylean and Congo-West African rain forest ant faunas. p. 161-185 in: Meggers, B. J., Ayensu, E. S., Duckworth, W. D. (eds.) Tropical forest ecosystems in Africa and South America: a comparative review. Washington, D.C.: **Smithsonian Institution Press**, viii + 350 pp.

Cuquetto-Leite, L.; Dolder, H.; Oliveira, P. S.; Espírito Santo, N. B.; Lino-Neto, J.; Mancini, K. C., 2017. Structural and ultrastructural characterization of the spermatozoa in *Pachycondyla striata* and *P. marginata*. **Insectes Sociaux**, v. 64, n. 2, p. 209–217.

DaRocha, W. D., Ribeiro, S. P., Neves, F. S., Fernandes, G. W., Leponce, M., Delabie, J. H. C., 2015. How does bromeliad distribution structure the arboreal ant assemblages (Hymenoptera: Formicidae) on a single tree in a Brazilian Atlantic forest agroecosystem? **Myrmecological News**. v. 21, p. 83-92.

De la Mora, A., Perez-Lachaud, G., Lachaud, J. P., Philpott, S. M., 2015. Local and Landscape Drivers of Ant Parasitism in a Coffee Landscape. **Enviromental Entomology**. v. 44, p. 939-950.

Do Prado, L. P., Feitosa, R. M., Triana, S. P., Gutiérrez, J. A. M., Rousseau, G. X., Silva, R. A., Siqueira, G. M., dos Santos, C. L. C., Silva, F. V., da Silva, T. S. R., Ferreira, A. C., da Silva, R. R., Andrade-Silva, J., 2019. An overview of the ant fauna (Hymenoptera: Formicidae) of the state of Maranhão, Brazil. **Papeis Avulsos de Zoologia**, v. 59, p. 0–4.

Emery, C., 1890. Voyage de M. E. Simon au Venezuela (Décembre 1887 – Avril 1888). Formicidae. **Annales de la Société Entomologique de France**. v. 10, n. 6, p. 55-76

Emery, 1900. Formiche raccolte da Elio Modigliani in Sumatra, Engano e Mentawai. **Annali del Museo Civico di Storia Naturale**. v. 40, p. 661-722.

Emery, C., 1901. Notes sur less sous-familles des Dorylines et Ponérines (Familles des Formicides). **Annales de la Société Entomologique de Belgique**. v. 45, p. 32-54.

Fabricius, J. C., 1804. Systema Piezatorum secundum ordines, genera, species, adjectic synonymis, locis, observationibus, descriptionibus. Brunswick: C. Reichard, xiv + 15-439 + 30 p.

Faircloth, B. C., Branstetter, M. G., White, N. D., & Brady, S. G., 2015. Target enrichment of ultraconserved elements from arthropods provides a genomic perspective on relationships among hymenoptera. **Molecular Ecology Resources**. v. 15, n. 3, p. 489–501.

Forel, A., 1899. Formicidae. [part]. **Biologia Centrali-Americana Hym.** v. 3, p. 1-24

Forel, A., 1901. Nouvelles espèces de Ponerinae. (Avec um nouveau sous-genre et une espèce nouvelle d'Eciton). **Revue Suisse de Zoologie**. v. 9, p. 325-353.

Forel, A., 1907. Formiciden aus dem Naturhistorischen Museum in Hamburg. II. Teil. Neueingänge seit 1900. **Mitt. Naturhist. Mus. Hambg.** n.24, p. 1-20.

Forel, A., 1912. Formicides néotropiques. Part I. **Annales de la Société Entomologique de Belgique**. v. 65, p. 28-49.

Forel, A., 1901. Variétés myrmécologiques. **Annales de la Société Entomologique de Belgique**. v. 45, p. 334-382.

Google maps. Available from <https://www.google.com/maps>. Accessed 04 December 2019.

Guénard, B., Weise, M., Gomez, K., Narula, N., Economo, E. P., 2017. The Global Ant Biodiversity Informatics (GABI) database: a synthesis of ant species geographic distributions. **Myrmecological News**. v. 24, p. 83-89.

Harris, R. A., 1979. A glossary of surfacing sculpturing. **Occasional papers in Entomology, State of California, Department of Food and Agriculture**, n. 28, p. 1-31.

Keller, R.A. 2011. A phylogenetic analysis of ant morphology (Hymenoptera: Formicidae) with special reference to the poneromorph subfamilies. **Bulletin of the American Museum of Natural History**, 355: 1-90.

Kempf, W. W., 1961. As formigas do gênero *Pachycondyla* Fr. Smith no Brasil (Hymenoptera: Formicidae). **Revista Brasileira de Entomologia**, Curitiba, v. 10, p. 189 - 204.

Kempf, W. W. 1972. Catálogo abreviado das formigas da região Neotropical. **Stud. Entomol.** v.15, p. 3-344

Lambeck, K., Rouby, H., Purcell, A., Sun, Y., & Sambridge, M., 2014. Sea level and global ice volumes from the Last Glacial Maximum to the Holocene. **Proceedings of the National Academy of Sciences of the United States of America**, v. 111, n. 43, p. 15296–15303. *apud* Wetterer, J. K., 2016. Geographic range of *Pachycondyla harpax* (Fabricius) (Hymenoptera: Formicidae). **Sociobiology**, v. 63, n. 1, p. 623–627.

Latreille, P. A., 1802. Histoire Naturelle des Fourmis, et recueil de mémoires et d'observations sur les abeilles, les araignées, les faucheurs, et autres insects. **Paris: Impr. Crapelet (ches T. Barrois)**. xvi + 445 pp.

Lattke, J. E., 2015. Estado da arte sobre a taxonomia e filogenia de Ponerinae do Brasil. In: Delabie, J. H. C.; Feitosa, R. M.; Serrão, J. E.; Mariano, C. S. F.; Majer, J. D. (Eds). As formigas poneromorfas do Brasil. Ilhéus: Universidade Estadual de Santa Cruz, 2015. p. 55-73

Longino, J. T., 2001. Ants of Costa Rica. Available from <<http://ants.biology.utah.edu/genera/Pachycondyla/SPECIES/harpax/harpax.html>> Accessed at 19.12.2019

Longino, J. T., 2010. Ants of Costa Rica. Available at <<http://ants.biology.utah.edu/genera/Pachycondyla/SPECIES/imprensa/imprensa.html>> Accessed at 10.10.2019

Longino, J. T., 2010b. Ants of Costa Rica. Available at <<http://ants.biology.utah.edu/genera/Pachycondyla/SPECIES/purpurascens/purpurascens.html>> Accessed at 19.12.2019

MacKay, W. P., MacKay, E. E., 2010. **The systematics and biology of the new world ants of the genus *Pachycondyla* (Hymenoptera: Formicidae)**. The Edwin Mallen Press. Lewinston. 660 pp.

Mariano, C. S. F., Pompolo, S. G., Lacau, S., Delabie, J. H. C., 2006. Questions sur la monophylie du taxon *Pachycondyla* Smith, 1858: approche cytogénétique sur le sous-

genre *Pachycondyla* sensu Emery, 1901 (Hymenoptera: Formicidae: Ponerinae). **Bull. Soc. Entomol. France.** v. 111, p. 299-304

Mayr, G., 1863. Formicidarum index synonymicus. Verhandlungen der Kaiserlich-Königlichen **Zoologisch-Botanischen Gesellschaft in Wien.** v. 13, p. 385-460.

Nixon, K C; Wheeler, Q D., 1990. An amplification of the Phylogenetic Species Concept. **Cladistics-the International Journal of the Willi Hennig Society**, v. 6, n. 3, p. 211–223.

Ortiz, G.; Camargo-Mathias, M. I., 2003. Morphohistological study of the venom gland in workers of the ant *Pachycondyla striata* F. Smith (Hymenoptera : Ponerinae). **Sociobiology.** Chico: Calif State Univ, v. 42, n. 1, p. 103-116.

Pereira, L. P. C., Almeida, F. S., Vargas, A. B., Araújo, M. S., Mayhé-Nunes, A. J., & Queiroz, J. M., 2016. Seasonal analysis of taxonomic and functional diversity of poneromorph ant assemblages in the Amazon forest. **Sociobiology**, v. 63, n. 3, p. 941–949.

QGIS Project. QGIS User Guide 3.4 – Available https://docs.qgis.org/3.4/en/docs/user_manual/. Accessed 04. Dec, 2019.

Richter, A., Keller, R. A., Rosumek, F. B., Economo, E. P., Garcia, F. H., Beutel, R. G., 2019. The cephalic anatomy of workers of the ant species *Wasmannia affinis* (Formicidae, Hymenoptera, Insecta) and its evolutionary implications. **Arthropod Structure & Development.** v. 49, p. 26-49.

Rodrigues, M. S., Vilela, E. F., Azevedo, D. O., Hora, R. R., 2011. Multiple Queens in Founding Colonies of the Neotropical Ant *Pachycondyla striata* Smith (Formicidae: Ponerinae). **Neotropical Entomology.** v. 40, n. 3, p. 293-299.

Roger, J., 1861. Die *Ponera*-artigen Ameisen (Schluss). **Berliner Entomologische Zeitschrift.** p. 1-54.

Roger, J., 1863. Verzeichniss der Formiciden-Gattungen und Arten. **Berlin Entomologische Zeitschrift.** v. 7, p. 1-65.

Sanjuan, T. I., Franco-Molano, A. E., Kepler, R. M., Spatafora, J. W., Tabima, J., Vasco-Palacios, A. M., Restrepo, S., 2015. Five new species of entomopathogenic fungi from the Amazon and evolution of neotropical *Ophiocordyceps*. **Fungal Biology.** v. 119, p. 901-916.

Santos, P. P., Games, P. D., Azevedo, D. O., Barros, E., De Oliveira, L. L., Ramos, H. J. O, Baracat-Pereira, M. C., Serrão, J. E., 2017. Proteomic analysis of the venom of the

predatory ant *Pachycondyla striata* (Hymenoptera: Formicidae). **Archives of Insect Biochemistry and Physiology**, v. 96, n. 3, p. 1-17.

Santschi, F., 1913. Hyménoptères. Formicides. p. 33-43 in: André, E., et al., 1913. Mission du service géographique de l'armée pour la mesure d'un arc de méridien équatorial en Amérique du Sud. Tome 10. Fasc. 1. Insectes. **Paris: Gauthier-Villars**. 119 pp.

Santschi, F. 1921. Ponerinae, Dorylinae et quelques autres formicides néotropiques. **Bulletin de la Société Vaudoise des Sciences Naturelles**. v. 54, p. 81-130.

Schmidt, C., 2013. Molecular phylogenetics of ponerine ants (Hymenoptera: Formicidae: Ponerinae). **Zootaxa**, Auckland, v. 3647, n. 2, p. 201-250.

Schmidt, C. A.; Shattuck, S. O., 2014. The Higher Classification of the Ant Subfamily Ponerinae (Hymenoptera: formicidae, with a Review of Ponerine Ecology and Behavior. **Zootaxa**, Auckland, v. 3817, n. 1, p. 001-242.

Scott-Santos, C. P.; Esteves, F. A.; Brandão, C. R. F., 2008. Catalogue of “poneromorph” ant type specimens (Hymenoptera, Formicidae) deposited in the Museu de Zoologia da Universidade de São Paulo, Brasil. **Papéis Avulsos de Zoologia**, São Paulo, v. 48, n. 11, p. 75-88.

Seifert, B., 2009. Cryptic species in ants (Hymenoptera: Formicidae) revisited: we need a change in the alpha-taxonomic approach. **Myrmecological News**. v. 12(September), p. 149–166.

Shrestha. B., Tanaka E., Hyun. M.W., Han. J.G., Kim. C.S., Jo. J.W., Han. S.K., Oh. J., Sung. J.M., Sung. G.H., 2017. Mycosphere Essay 19. Cordyceps species parasitizing hymenopteran and hemipteran insects. **Mycosphere**. V.8, n. 9, p. 1424–1442

Silva, R. R., Brandão, C. R. F., 2014. Ecosystem-wide Morphological Structure of Leaf-Litter Ant Communities along a Tropical Latitudinal Gradient. **PLoS ONE**. v.9, n. 3.

da Silva-Melo, A.; Giannotti, E., 2010. Nest architecture of *Pachycondyla striata* Fr. Smith, 1858 (Formicidae, Ponerinae). **Insectes Sociaux**, v. 57, n. 1, p. 17–22.

da Silva-Melo, A., Giannotti, E., 2011. Life expectancy and entropy values for workers of *Pachycondyla striata* (Hymenoptera: Formicidae: Ponerinae). **Sociobiology**, v. 58, n. 1, p. 143–150.

da Silva, O. G. M., Fernandes, T. T., da Silva, R. R., Souza-Campana, D. R., Morini, M. S. C., 2016. Twigs of *Albizia niopoides* (Spruce ex Benth.) Burkart as a nesting resource for ants (Hymenoptera: Formicidae). **Revista Brasileira de Entomologia**. v. 60, n. 2, p. 182-185.

Smith, F., 1858. Catalogue of hymenopterous insects in the collection of the British Museum. Part VI. Formicidae. London. **British Museum**. 216 pp.

Souza, J. L. P., Baccaro, F. B., Pequeno, P. A. C. L., Franklin, E., Magnusson, W. E., 2018. Effectiveness of genera as a higher-taxon substitute for species in ant biodiversity analyses is not affected by sampling technique. **Biodiversity and Conservation**, v. 27, n. 13, p. 3425–3445.

Strelnikov, T. D., 1928. Mermis parasitism in *Pachycondyla striata*. **Psyche**. p. 199-200.

Thiele, E., Camargo-Mathias, M. I., 1999. Morphology, ultramorphology and histology of ovaries of workers and mated queens of *Pachycondyla striata* ants (Hymenoptera : Ponerinae). **Biocell**. Mendoza: Inst Histol Embriol-conicet, v. 23, n. 1, p. 51-64.

Thiele, E., Camargo-Mathias, M. I., 2003. Morphology, ultramorphology and morphometry of the fat body of virgin females and queens of the ants *Pachycondyla striata* (Hymenoptera : Formicidae). **Sociobiology**. Chico: Calif State Univ, v. 42, n. 2, p. 243-254.

Tudor, A., Starr, C., Mohammed, K., 2016. Trophic ecology of the ant *Pachycondyla crassinoda* (Formicidae: Ponerinae) in a lowland Neotropical forest. **Sociobiology**. V. 63, n. 2, p. 744-747.

Velasco, Y. A. M., Delabie, J. H. C., Costa, M. A., Lacau, S., Mariano, C. S. F., 2014. Studies on the karyotype of the ant *Pachycondyla harpax* (formicidae: Ponerinae: Ponerini) in southern Bahia, Brazil. **Florida Entomologist**. v. 97, n. 3, p. 1049-1055.

Wetterer, J. K., 2016. Geographic range of *Pachycondyla harpax* (Fabricius) (Hymenoptera: Formicidae). **Sociobiology**, v. 63, n. 1, p. 623–627.

Wheeler, W. M., 1925. Neotropical ants in the collections of the Royal Museum of Stockholm. **Arkiv för Zoologi**. v. 17a, n. 8, p. 1-55

Wheeler, W. M., 1928. Mermis parasitism and intercastes among ants. **The Journal of Experimental Zoölogy**. v. 50, n. 2, p. 165-237.

Wheeler, 1936. Ecological relations of ponerine and other ants of termites. Proceedins of the American Academy of Arts and Science. V. 71, p. 159-243.

Wheeler, G. C., Wheeler, J., 1952. The ant larvae of the subfamily Ponerinae. Part II. **The American Midland Naturalist**. v. 48, n. 3, p. 604-672.

Wild, A. L., 2002. The Genus *Pachycondyla* (Hymenoptera: Formicidae) in Paraguay. **Boletin del Museo Nacional de Historia Natural de Paraguay**. v. 14 (1-2), p. 1-18.

Wilson, E. O., 1955. A monographic Revision of the ant genus *Lasius*. **Bulletin of the Museum of Comparative Zoology**, v. 113, n. 1, p. 1-204.